सत्यमेव जयते

REPORT

of the

NATIONAL TRANSPORT POLICY COMMITTEE

Government of India

Planning Commission
New Delhi

MAY 1980

CONTENTS

Introduction

The National Transport Policy Committee was appointed by Government Resolution No. T&C/3(15)/77 dated 26 April, 1978,* comprising the following members :

Chairman

Shri B. D. Pande

Members

Air Chief Marshal P. C. Lal ;
Shri G.P. Warrier ;
Dr. F.P. Antia ; and
Dr. M.Q. Dalvi.

Member-Secretary

Shri S. P. Bagla

2. Dr. V.G. Bhatia in his capacity as Adviser (Transport), Planning Commission, was co-opted as a member later, and he served on the Committee from October 1978 to September 1979.

3. The Terms of Reference of the Committee were :

(1) To propose a comprehensive national transport policy for the country for the next decade or so, keeping in view the objectives and priorities set out in the Five Year Plan. In formulating such a policy, the Committee will :

(a) recommend an optimal inter-modal mix of different systems and also suggest appropriate technical choices within each system, keeping in view the need to generate maximum employment potential ; and

(b) suggest organisational, administrative, fiscal and legal measures required for planning, implementing, monitoring and evaluating programmes formulated for giving effect to relevant components of the national transport policy by the Central and State Governments and major transport agencies at both the National, State and local levels.

(2) To identify the areas in which the data base of the transport system should be strengthened in order to be able to formulate integrated transport plans, and to suggest procedures and methodologies for formulating and appraising such plans at the Central, State, District and Block levels.

(3) To recommend areas in which research and development in the transport field should be undertaken and the institutional framework for carrying it out.

(4) To suggest measures for improving training facilities in transport planning and management.

(5) To recommend any other measures which the Committee may consider relevant in relation to items (1) to (4) above.

4. The first meeting of the Committee was held in New Delhi on 19 May 1978 at which the methodology to be adopted for analysis of components of transport policy was discussed, along with the steps to be taken for compilation of data on pertinent issues, and collation of views to be obtained from concerned Ministries of the Government of India, State Governments, Union Territory administrations, user interests, transport operators and experts. It was decided that as transport requirements varied from one region to another and that as determination of an inter-modal mix of transport would require an in-depth analysis of relevant and connected issues, it would be useful to issue a comprehensive questionnaire and invite opinions of all those conversant with and interested in development of transport in the country. The questionnaire devised by us consequently covered not only conceptual or general but also specific issues relating to different modes of transport and their development.

* As amended *vide* Corrigendum of the same number dated July 5, 1978 (Appendix 1.2).

5. The response to the questionnaire was encouraging. Of the 350-and-odd organisations and individuals to whom it was addressed, 210 responded—152 by replying to it and 58 by sending special memoranda to us. Of the replies and memoranda received, 21 were from Ministries and Departments of Government of India, 40 from State Governments, 47 from private road transport operators and their associations, 21 from chambers of commerce and other user interests, 7 from commercial banks and financial institutions, 25 from autonomous bodies and organisations and 23 from transport economists, planners. scholars and others. During the course of our deliberations, in all over 2000 persons responded to our invitation and met us.

6. We also decided to constitute six working groups, consisting of experts and intelligent observers of transport development, to make an in-depth analysis of the following issues :

(1) Policy on construction of new railway lines;

(2) Rural roads;

(3) Employment intensities of modes of transport;

(4) Transport pricing, taxation and subsidy;

(5) Freight equalisation; and

(6) Urban transport.

7. We examined the need for commissioning specialised studies on subjects like energy and employment intensity of modes of transport, problems of intermediate transport in urban centres, economics of short haul air services, usefulness of dumps, and the position of inland water transport in the country. Subsequently, it was decided to assign nine crucial themes for research to centres and institutions, as detailed below :

(1) Employment Potential in Inland Water Transport—National Traffic Planning and Automation Centre, Trivandrum.

(2) Energy Intensity of Different Transport Modes—National Institute for Training in Industrial Engineering, Bombay.

(3) Employment Potential of Road, Road Transport and Railways—National Council of Applied Economic Research, New Delhi.

(4) Road Transport Facilities in a Medium-sized Urban Area—Central Institute of Road Transport, Pune.

(5) Working of Dumps for Steel and Coal—Khosla Consultants, New Delhi.

(6) Urban Transport Policy for Large and Medium sized cities in India—Indian Institute of Management, Ahmedabad.

(7) Economic Evaluation of Operating Short Haul Air Services—Indian Institute of Management, Bangalore.

(8) Role of Intermediate Public Transport—School of Planning and Architetcure, New Delhi.

(9) Social Benefits accruing from Rail and Road—Khosla Consultants, New Delhi.

8. Besides these research studies, we requested the Rail India Technical and Economic Services (RITES) to compile and collate for us data on traffic and commodity flows by rail, road and coastal shipping, along with their comparative costs, which were of critical importance for an analysis and determination of an optimal inter-modal mix of transport in the country.

9. We have drawn heavily on data collated and analysed by these research oragnisations, including RITES, on reports of working groups constituted by us, and on the study conducted at our instance by the Government of Maharashtra through the University of Bombay on the west coast transport network. We place on record our sincere appreciation for the valuable work done by all of them. We were able to obtain from or through them relevant data without which it would not have been possible for us to assess objectively our transport requirements and determine an optimal inter-modal mix for the country. These studies and reports carry a wealth of data.

10. We felt that discussions at State capitals with Chief Ministers and their colleagues would be

of immense help to us in appraising ourselves of the magnitude and variety of transport problems of different regions of the country as well as for ascertaining their opinions on the manner in which they could be dealt with and solved. Accordingly, we began a round of discussions with State authorities from 19 June 1978. We held discussions with all State Governments and administrations of Union Territories and received detailed memoranda from them. In a few cases, special memoranda on specific problems of these States were also obtained. We owe our thanks to all the State Governments and Union Territory administrations for their whole-hearted co-operation and assistance to us.

11. We also held detailed discussions with organisations representing users, operators, consumers and labour during our visits to State capitals. We owe our thanks to all of them for giving us relevant information and useful suggestions.

12. We held detailed discussions with Ministers of Railways, Shipping and Transport, Tourism and Civil Aviation, Finance, Home and Industries in New Delhi. At official level, detailed discussions were held with Secretaries and other officers in the Ministries of Agriculture and Irrigation, Commerce, Civil Supplies, Defence, Energy, Finance and Economic Affairs, Home, Industries and Industrial Development, Labour, Petroleum, Chemicals and Fertilisers, Rural Reconstruction, Steel and Mines, Science and Technology, Shipping and Transport and Tourism and Civil Aviation, and with the Chairman and Members of the Railway Board. These discussions gave us an insight into the complex, interlinked problems of transport co-ordination, magnitude of the task involved in meeting requirements of transport consistent with growth of the national economy, and all-round adverse repercussions in economic activity as a consequence of bottlenecks in transport services. We place on record our sincere gratitude to all of them for their co-operation.

13. We were asked by the Planning Commission to make quick study of the economics of short haul air services, and submitted our interim report on it on 31 March 1979. The main conclusions of the interim Report have been incorporated in this Report as well.

14. In our Report we have first analysed such conceptual and general problems as the status of transport in economic development, basic objectives of a trasport policy, and energy and employment intensities as well as resource cost of modes of transport to the economy. Based on these conceptual analyses and supplemented by statistical evidence, we have attempted an inter-modal mix on an all-India basis. We have dealt also with such other general problems as transport finance, pricing, taxation and subsidy, freight equalisation, problems of transport co-ordination, transport planning and establishment of a data base, and research and development. Thereafter, we have discussed problems of specific modes of transport, covering railways roads, road transport, urban transport, air transport, coastal shipping, island water transport, ports and harbours, ropeways and pipelines. Finally, we have appended a summary of our recommendations to the Report.

15. We should like to acknowledge and place on record our deep appreciation of painstaking work by our officers and research staff. The collection, compilation and analysis of massive data we received was completed by staff of UNDP Transport Policy Planning Project, as the committee had hardly any staff of its own. We owe our gratitude to the Transport Policy Planning Project team and other staff of the Planning Commission, which served as our research secretariat. We would like to refer especially to the valuable work done by S/Shri Mahesh Kapoor, R.C. Sharma, Y. Verma, Deputy Advisers, Dr. R.K. Saggar, Consultant, S/Shri B.N. Puri, R.C. Srinivasan, O.P. Batra and Km. Manjula Ramaswamy. We should also like to place on record our appreciation of suggestions made to us by Dr. V.G. Bhatia. We also thank Shri Shyam Ratna Gupta who helped us in editing the Report.

16. The text of the Government Resolution on the Constitution of the Committee and its terms of reference, the text of the questionnaire issued by us, a list of the Working Groups set up by us together with the composition and terms of reference and a list of the Research Team and non-technical staff that worked for the Committee are given in an Appendix at the end of the Report.

Explanations

1 billion	=	1,000 million = 10^9
1 million	=	10^6
1 crore	=	10 million = 100 lakh = 10^7
1 lakh (lac)	=	1,00,000 = 10^5
TWH	=	10^9 KWH

Abbreviations

b	=	billion
m	=	million
km	=	kilometre
pkm	=	passenger kilometre
tkm	=	tonnes kilometre
c.i.f.	=	cost insurance freight
KWH	=	Kilo Watt Hour

Note:—First number of paragraphs and tables indicates chapter numbe

Chapter 1

Objectives of National Transport Policy : Main Issues

1.1 Introduction

1.1.1. The formulation of a correct approach to a national transport policy should appropriately begin with an examination of the broad social and economic background within which the transport system operates in a country and the socio-economic objectives and priorities it has to serve, so that development of the transport sector proceeds in close conformity with needs of the economy.

1.1.2 Before independence, the transport system, comprising mainly railways and roads, was developed primarily to provide communications with the major ports and larger cities, keeping in view the administrative, strategic and trade imperatives of that time. The focus changed after independence as, along with the rehabilitation of railways and reconstruction of highways, which were damaged or neglected during World War II, concern was simultaneously shown for the first time for rebuilding the transport network and linking it with developmental needs of the economy. Not only were programmes and projects formulated to extend the country's rail and road network but attention was given also to development of shipping, ports, air and other modes of transport. With the initiation of industrial development programmes, however, the main objective underlying the planning of the transport system was a systematic movement of raw materials to plant sites and of finished products to points of consumption, particularly in respect of steel, power and heavy industry. Further, the needs of inter-city and urban passenger movement were brought into focus. A proportion of investment was diverted to promotion of transport in the backward regions as a stimulus to their economic advancement.

Plan Outlays and Long-term Perspective

1.1.3 The magnitude of effort devoted to development of the transport sector is broadly expressed in plan outlays on transport. Between the First and the Fifth Plan (1974-79), the outlay rose from Rs. 434 crores to Rs. 5,420 crores (at current prices). The Sixth Plan (1978-83) has allocated Rs. 8,621 crores for the transport sector. Despite the phenomenal increase in absolute figures, however, the share of transport in total plan outlays, which was 22.1 per cent in the First Plan and 23.5 per cent in the Second Plan, declined steeply to 12.1 per cent in the Sixth Plan.

1.1.4 The key role of transport in development of the national economy has been undoubtedly recognised since the inception of the First Plan, but in determination of overall plan allocations it did not receive a matching priority with power or irrigation. In the face of financial constraints the approach to transport was generally towards creation of capacities mainly for moving specific categories of traffic for industrial projects and providing relief for passengers on congested urban networks. A comprehensive attempt to prepare a long-term transportation plan for the country as an integral part of the national macro-economic plan has still to be made. To develop and calibrate such a transportation planning model is admittedly a difficult and complex process, as it requires detailed data and analysis of regional trade flows and comparative resource costs of movement by various modes of transport. Such data on this scale are not presently available, although the Planning Commission has taken the initiative in filling the gap by entrusting a study on these lines to Rail India Technical and Economic Services Limited (RITES). The Planning Commission has also constituted a Transport Policy Planning Project, the objective of which is to improve the forecasting methodology of transport demand in the country.

1.1.5 The need for taking a long-term view of transport requirement is reinforced by the knowledge that these tend to grow much faster and to a greater degree than the growth of industrial and agricultural

outputs. For instance, empirical studies indicate that income elasticities of transport demand exceed unity. Moreover, it takes time to build transport capacities and therefore, planning for transport investment has to be undertaken in anticipation of demand, so that transport congestions or bottlenecks do not seriously impede progress of the economy.

1.2 Transport Demand

1.2.1 As a service, transport, whether it is movement of goods or people, is a derived demand, for it is a means of serving other objectives and does not exist in isolation or for its own sake. Some of these objectives are economic in character—for example, exploitation of natural resources, increase in agricultural productivity and industrial output, enhancement of consumption levels, and diversification of the economy. Side by side with these objectives are those of a non-economic nature which include promotion of political cohesion, reinforcement of national security and encouragement to socially desirable settlement patterns. Further, economic and non-economic objectives are not always consistent; in fact they are often incompatible. This throws up a serious dilemma for those engaged in developing an optimal transport system for the country.

1.2.2 Of the two basic components of transport demand, namely, freight and passenger traffic, the former is directly connected with the level of economic activity and development needs and has accordingly received greater attention in planning priorities. There is an assumption that so long as transport capacity is inadequate to meet the needs of freight traffic, it is not essential to provide for passenger services or personal travel. In our view, this assumption stems from a limited appreciation of the fact that a segment of passenger traffic, particularly journeys to and from work and business travel, is as essential to development and maximisation of production as freight traffic. Besides, it is incorrect to label non-work passenger journeys as socially wasteful entitled to lower or no priority at all. In a developing country like India, most non-work travel undertaken by people in cities and on inter-city routes is linked with essential social needs, such as visits to families, educational institutions, religious centres and other similar purposes. It is thus not clear at what stage in the country's development, transport planners should accord the same priority to passenger travel as to freight transport. In the circumstances, as long as resource position remains as precarious as it is today, planners should continue to search for a balance between the needs of economic growth and those for amelioration of travelling conditions of the general public. In the ultimate analysis, this depends upon the manner in which we define the scope of social welfare. In our view, passenger traffic situation has deteriorated due to relative neglect in the past, and it is time that a departure is made in transport policy to correct the present imbalance in our traffic structure.

1.2.3 Secondly, the transport system must concern itself with the needs of the rural sector which accounts for eighty per cent of the Indian population. Out of 575,936 villages in the country, as many as 407,297 are still to be connected by all-weather roads. The Working Group on Rural Roads has calculated that to connect the villages with an all-weather road link within 1.6 km. range of the road network, an investment of Rs. 11,000 crores in road construction would be required. In resource terms, this target will be difficult to achieve even if the planning horizon were extended over the next three Five Year Plans or to 2000 A.D. These figures underline the scale and magnitude of the task involved in construction of rural roads if the basic objectives of providing a minimum level of accessibility to our villages is to be achieved within a reasonable time span. No doubt, transport requirements for development of the nation's productive potential should continue to receive priority. But in the formulation of future transport policy which ensures internal consistency in development planning, attention must also be given to transport needs of the rural areas together with inter-urban and intra-urban passenger travel of an essential character.

1.3 Land-use and Location

1.3.1 Transport demand has two dimensions. First, it relates to the number of people to be carried or the tonnes of goods to be moved and, secondly, the average distance covered. Broadly, the number of people to be carried and goods tonnage to be moved are correlated to the size of population and level of economic activity, whereas the average lead depends on location of people and their activities in regional and urban spaces. The quantum of transport demand, expressed in passenger-kilometres or tonne-kilometers, is thus closely linked with land-use

patterns and location of economic activities. Keeping in view the objective of minimising total transport effort, we should not only seek to plan the total tonnage of traffic moved or the number of journeys made but also the average distance over which these movements take place. Spatial movement of traffic cannot accordingly be controlled unless we understand the factors that motivate people in selection of their location and their activities in geographic areas.

1.3.2 Efficient land-use and location planning can help in optimisation of transport effort in two ways. First, to the extent that it promotes dispersal of economic activities to the rural areas and smaller towns, it is likely to slow down the rate of migration of people to the larger urban centres. Secondly, as productive activities and residential opportunities are juxtaposed, it can reduce movements of men and materials on inter-urban as well as intra-urban transport system.

1.3.3 In the Indian context, the larger cities, particularly the metropolitan areas, are extremely overcrowded and any reduction in the inflow into these cities, induced by proper land-use and locational planning, is of paramount importance. While we emphasise the need for creating larger employment opportunities in the villages and smaller towns to check migration of population from the rural to urban areas, we do not support the view that such migration can really be contained only by depriving the larger urban centres of resources required for expansion of infra-structural facilities, including transport, for improved levels of civic life. A negative approach to control the rate of growth of urbanisation, in our opinion, is neither justifiable nor practicable anywhere in the world. For inadequate investment on transport and other infrastructural facilities for the larger cities may have a deleterious impact on urban life, including the level of mobility, which may generate social tensions in the urban areas and jeopardise national harmony.

1.3.4 An efficient and effective land-use policy has a vital role to play in decelerating the growth of our metropolitan cities and, consequently, in reducing the quantum of resources required for the ever-growing transport demands in these cities. We analyse elsewhere the interaction between land-use and transportation and its impact on urban transport demands*.

1.3.5 While a good land-use plan is of vital importance for development of an optimal transport system, there are two major constraints which limit in practice its usefulness in promoting a balanced spatial allocation of economic activity. First, since regions in a given economic setting are often differentially endowed with natural resources, efficiency in spatial allocation of resources may be inconsistent with the needs of balanced regional growth, an objective the government may want to pursue for bringing about regional equality in income distribution. Secondly, land-use planning generally tends to ignore agglomeration economies or diseconomies. In real life, however, such economies exist on a large scale and are the primary factor accounting for concentration of activities in larger urban centres. Hence, in the face of these conflicting factors, it is not realistic to expect that land-use planning would per se eliminate inefficiencies in spatial allocation of industries. To sum up, a good land-use plan, in our view, is a necessary but not a sufficient condition for development of an optimal transport system.

1.4 Characteristics of Transport Supply

1.4.1 At this stage three observations may be made in regard to transport investment decisions which, in comparison with other economic sectors, are difficult and complex in character. First, as investment must be made in large, indivisible chunks each time a new transport facility is to be created, investible funds have to be diverted from other competing sectors. This has an important bearing on determining inter se planning priorities for the country. Secondly, the long-term nature of transport investment introduces an element of risk and uncertainty in the appraisal procedure, for example, the expected demand for the transport service may fail to materialize or technological developments in transport may render the facility obsolete. However, while in practice very little can be done at the planning stage to safeguard a particular investment from future technological innovations in the transport sector, great care has to be exercised to ensure that the decision is based on a realistic appraisal of traffic demand, so that investment is not rendered uneconomical.

* An analysis of these issues is given in Chapter 12.

Apart from technological obsolescence, there is also another serious risk, namely, an unexpected change in the country's land-use pattern may make a transport service redundant at its present location. Such a risk is particularly important for location-specific transport projects, not generally transferable to other places without substantial loss.

1.4.2 Thirdly, the inordinately long lags generally involved in construction of transport projects also create difficulties in planning of transport supply. Obviously, the longer these lags the greater the urgency for undertaking abvance planning for creation of transport facilities. Moreover, apart from a normal construction lag associated with capital-intensive transport projects, the provision of transport supply is usually bogged down by what may be called a planning time-span, that is, the time taken by the concerned authorities in conceiving, designing, appraising and, finally, approving a particular project. This latter point is relevant as much time is often lost in sanctioning projects even when economic justification for them is fully established. We urge that every effort should be made in future to reduce delays in planning of transport projects and accord timely approval to those the justification for which has been firmly established in techno-economic reports.

1.5 Transport and Economic Development

1.5.1 That economic development requires adequate and effective transport services is axiomatic. That there exists, for a given country at a specified stage of development, a theoretically optimum amount of transport capacity is also generally accepted. Nonetheless, agreement on determination of these capacities and implied rate of investment is far from unanimous.

1.5.2 Contemporary opinion on the role of transport in economic development falls broadly into two divergent schools of thought. There is a school which maintains that development of social overheads, including transport, should precede growth of other economic activities and hence investment in social overheads should be made in anticipation of future demand, instead of as a sequel to capacity shortages. The rationale underlying this argument is that once social overhead capacities are created they generate a variety of external economies which reduce the cost of inputs used by other economic activities. This serves as a powerful stimulus for exploiting unutilised and underutilised resources which would otherwise have remained unused for want of infra-structural facilities. The other school of thought holds opposite view and argues that transport and other infra-structural facilities should be built only in response to bottlenecks and capacity shortages, not in anticipation of demand that may not, after all, materialise. The justification for this view is two-fold - the risk and uncertainty associated with long-term investments and the general belief that investments on the large scale generally required for development of social overheads are not easy to plan.

1.5.3 During our visits to various States, we were faced with persistent demands for investment in capital intensive transport projects, particularly new railway lines, on the ground that this would promote development of the under-developed areas. We have given serious thought to the question of whether transport investment is really an essential pre-requisite for economic development, or it should follow development of other economic activities which generate adequate demand for transport services. Endowing an area with a highway or a railhead will not by itself result in an upsurge of new industrial or agricultural activity. Apparently, expansion of transport is permissive; it enables a dynamic developing situation to work its way and can reinforce existing motivations. The degree to which transport creates or compels new activity will depend upon other equally necessary conditions within the economy, such as the quality of its administrative structure and social order, the level and quality of education, the zeal and drive of its entrepreneurial class, and other dimensions of the people's prospensity to grow. If these qualities are deficient, transport investment is unlikely to start the process of self-propelling growth.

Inadequacy of Transport—a Deterrent to Growth :

1.5.4 While, therefore, we do not subscribe to the view that transport investment will by itself bring about economic uplift of backward areas, we, at the same time, consider it necessary to emphasize that inadequacy of transportation acts as an inhibiting factor in the actual process of development. As development planning has become an integral part of

the economic way of our life, the chicken-or-egg-first argument for transport is of academic interest. As we have stated, construction of a new railway line or a road in a less developed part of the country will not automatically bring about an economic transformation of the region. But if construction of such a facility forms an integral part of development plan for the region and selection of the project is based on comparative cost-analysis of different modes of transport, its construction prima facie will be an essential pre-condition, without which development of the region will be hampered. In such a case, any delay in construction of the project until sufficient traffic demand for the service builds up is like putting the cart before the horse. Indeed, in planned development, where different sectors of the economy are expected to grow in close co-ordination, transport is only one of the essential elements of an integrated plan for area development.

Transport Capacity in Anticipation of Demand

1.5.5 The case for creation of transport capacities in anticipation of future demand rests logically on two stronger considerations. First, transport like power is a non-traded commodity, that is, its services cannot be imported and, secondly, transport investment is lumpy in character. It is, therefore, necessary to allocate funds for creating transport capacity even if the demand for its service does not justify investment on the basis of its commercial viability. Secondly, the lumpiness of investment also makes it necessary to create capacities on a scale larger than is justifiable in relation to immediate demand if we are to benefit from economies of scale associated with a transport plan. Thus, for example, once the need for railway investment is established, at least a single track must be constructed along with the concomitant linehaul and terminal facilities for the benefits to accrue. Similarly, a road with a sufficient width must be built between two points before it has any utility.

1.5.6 For an airport to handle major international traffic, it must likewise be built to accommodate the largest jet aircraft. Complementary or supplementary investment requirements increase the "lumpiness" of many transport investment projects. A new major port can be viable only tf a rail system connecting the port with the hinterland is simultaneously constucted as part of a system project.

1.6 Size of Transport Investment

1.6.1 The three central issue to be considered in evolving an integrated framework for transport policy are : (i) determination of the size of total transport investment, that is, quantum of resources - capital, foreign exchange, scarce materials and manpower - which should be devoted to development of the transport sector as a whole; (ii) distribution of these resources between various modes of transport; and (iii) tariff for transport services, taking into account the return on investment made thereon*.

Need for Increased Financial Allocations

1.6.2. The question of total quantum of resources to be invested in transport development is, in a sense, related to the role of transport in economic development. Our assumptions regarding technical indivisibility of transport and the consequent need for creating capacities ahead of market demand are equally applicable in the present context. The allocation of funds to the transport sector has perforce to be larger than to those sectors where the incidence of lumpiness is not so heavy. It may, however, be argued that if a country's macro-economic plan is based on an inter-sectoral input-output model, as is the case in India, and if sectoral forecasts produced by this model are accurate and reliable, there could hardly be any logical reason for denying adequate investment funds to transport vis-a-vis other sectors. All the same technical considerations, namely, that it takes a fairly long time to built transport capacities, and that, except for building of village roads, construction of most line-haul and terminal facilities must be undertaken in large units, imply that more resources are required for transport than is indicated in input-output consistency models. These considerations are powerful arguments, in our view, for including transport in the priority sector for determination of inter se priorities for the plan.

1.6.3. It must, however, be conceded that lumpiness is not a feature peculiar to the transport sector

* The second and third issues are dealt with in greater detail in Chapters 3 and 4 in which we examine the problem of determining optimal intermodal mix and pricing of transport services.

alone. Nor are the gestation lags of other sectors any the less important. Wherever such technical characteristics are applicable, the same criteria must more or less prevail in determination of inter se priorities.

Transport Investment and Economic Growth

1.6.4. Another important factor to consider is whether there is any evidence of an empirical relationship between transport investment and rate of growth of national output. The proportion of gross capital formation in transport to gross domestic product ranged from 0.99 per cent to 2.84 per cent in the period 1951-52 to 1976-77. However, these percentages do not indicate any causal relationship between the rate of capacity created in transport and of growth of national output. If it is correct to postulate that there is such a causal relationship, it must be tested by empirical evidence. We have attempted this* and we find that there is a significant correlation between transport capacity and growth rate in India. Studies undertaken for other developing countries, for example, Kenya and Venezuela, among others, also confirm a close correlation between capacity creation in transport and growth of GNP.

1.6.5. As there is also a critical rate at which net capacity should be created in transport each year to maintain total transport capacity at its optimal level, the planning authorities have to examine these relationships systematically, so that the total resources for transport development are adequate all the time. It is, however, not possible to specify a precise or fixed figure at which the share of transport in the total national or public sector outlay should be maintained in every Five Year Plan.

1.6.6. What we are here seriously concerned with is the progressive decline in the share of transport in total plan outlay, and we feel that if this trend continues it could severely damage our national economy. Presently, our major ports, most of our airports and the major trunk routes of our highways and railways, are all operating under severe pressure due to capacity shortages. True, part of the current shortages are of a temporary nature, as they have arisen from unexpected changes in traffic pattern of the country. Nor are all the agencies or networks of the transport system operating at optimum levels. But the fact remains that there is presently hardly any resilience in our transport system to enable it to cope with sudden and unforeseen demands on it.

1.6.7. We attach the greatest importance to the need for maximum economic use of all available capacities in the transport system wherever they exist, but we do not subscribe to the view that during the planning period since 1951 any mode of transport had received a disproportionate share of public funds for investment and had consequently developed surplus capacities.

1.7 Investment Policy and Inter-modal Mix

1.7.1 The central issue of investment policy is to allocate total resources assigned for transport development between agencies of transport system to meet transport needs of the economy at minimum cost to the society. The crux of the problem thus is to determine an optimal inter-modal mix in the context of dynamic growth and broad criteria for allocations between agencies of the transport system.

1.7.2 A number of general propositions may be made on this subject. First, in framing an integrated approach to transport policy, it is useful to view the inter-modal mix from a system's point of view, that is, a system in which modes of transport complement, rather than substitute, each other—each mode performing a job for which it is best suited on the basis of its comparative resource cost advantage. The central question here is the method we should adopt to measure the comparative cost advantage of agencies of transport. We also have to consider what element should be included in or excluded from that measurement, so that there is a fair approximation of what may be called "resource cost to the economy" **. The comparative resource cost of various modes of transport cannot, in principle, be correctly computed unless a rough idea is formed of the volume and composition of

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* See Table 1.1 in annexure 1.1.

** For definition of resourcs cost, see Chypter 3.

future traffic. It is, therefore, necessary to formulate estimates of future traffic demand at the macro-economic level for a realistic determination of comparative modal costs and projected traffic flows allocated between different modes.

1.7.3 The primary purpose of obtaining such traffic forecasts is to provide a perspective on growth rather than a rigid frame. The traffic forecasts and their inter-modal flows should be computed for a fairly long time-horizon, say, from 10 to 15 years in conformity with longevity of life of most transport assets. Finally, we have to consider what shadow prices to adopt for energy and other scarce inputs used by transport industry. Foreign exchange being always scarce, we have to see how best we can and should use it by putting a shadow price on oil, the import of which accounts for a substantial part of our foreign exchange payments. The question of putting shadow prices on scarce inputs raises many related questions. The crucial question is how far and to what extent market prices, affecting consumer behaviour, should influence the policy considerations of planners for transport investment decisions; or to what extent social costs like that of congestion, pollution, and ecological imbalances should weigh with the planners, to avoid any distortions consumer behaviour may introducc in the economic system.

1.8 Pricing Policy

1.8.1 This brings us to the pricing and subsidy policy in transport. The first basic principle for pricing is that it must be cost-based, the user to pay at least the full marginal resource cost of his transport.* The short-run marginal cost is the minimum price the user should in any case pay; any mark-up above the figure is in effect in the nature of contribution from users to capital cost.

1.8.2 Once a facility is created and capital utilised, what rate of return a transort undertaking should earn on it essentially depends on the quantum of resource mobilisation by the Government. The Government may wish to ensure as a matter of policy that capital earns a rate of return in transport generally corresponding to its scarcity value in the economy. But depending on demand elasticity for the service, the Government may aim at earning a higher rate of return on a particular investment in transport. The more inelastic the demand, the greater is the opportunity for generating resources by charging prices above the short-run marginal cost. While the extent of actual mark-up above short-run operating costs is thus a matter of resource mobilisation policy and demand elasticity, a rational pricing policy should ensure that in no case would transport tariffs be lower than short-run operating costs. In a planned economy, another sound pricing principle is collection of revenue by a transport undertaking above the minimum level required to cover its short-run operating costs, including maintenance, the additional revenue to accrue to the exchequer as part of a national pool of resources. The transpoit undertakings can draw upon this pool for their normal requirements covering replacement, modernisation and capacity expansion in accordance with inter se investment priorities determined by the Government on broad premises of economic develoment.

Need for Uniform Pricing Framework

1.8.3 The second general propositon is that since track costs are directly borne by some modes of transport (for example, railways, which own and operate their own track) but not by others, (for example, road operators as roads are operated by central, state or local government or authorities which in turn seek to recover the cost incurred through taxation), it is essential that modes of transport be treated equally for determination of an acceptable framework for pricing policy. To some extent, the marginal cost principle obviates this problem. However, if a fully distributed cost-based pricing system is adopted, it is not clear how such equality can be ensured in view of the complexities in tracing each element of cost to particular kinds of services or quantities of output produced by various modes of transport. For some transport agencies, such as roads and water transport, for example, there is the still more vexatious issue of determining whether and to what extent users in the aggregate bear the cost of track facilities provided to them by the Government or other governmental agencies.**

* For definition of marginal resource cost, see Chapter 3

** Also see Chapter 4.

Subsidies

1.8.4 Another general issue concerning transport pricing relates to subsidisation. In general, subsidies are inefficient as they may lead to misallocation of resources. Hence, an attempt should be made to discard them, unluss there are weighty considerations for their retention. If subsidies have to be retained on social or societal considerations they most be explicit. For an implicit or concealed subsidy does not allow aproper-examination of its desirability or necessity, these being the two fundamentai criteria recom- mended by the Working Group on Transport Pricing, Taxation and Subsidy for rationalising transport pricing structure. We fully endorse the Group's veiws on these issues for framing a future transport pricing policy, as they constitute a significant departure from the present position.

Internal Cross-Subsidisation

1.8.5 There is, however, need to distinguish between a subsidy received from the exchequer by a transport undertaking to cover its year-to-year operating losses and a cross-subsidy within the undertakings to cover its losses on some operations out of profits earned on others. As a transport agency generally operates a network of services, consising of remunerative as well as non-remunerative routes, there is fundamentally nothing wrong, in our view, if it adopts cross-subsidisation within certain limits. The problem arises if cross-subsidisation becomes so burdensome that it leads to undesirable redistributive effects between different income groups. Such a situation may arise if for example, high wage earning commuters in the metropolitan cities were to be subsidized by railways from revenues earned from their inter-city passenger business, which may presumably be accounted for by relatively low income earners. Such cases, however, appear to be few and far between in actual practice. But for these exceptions, we see no objection to the practice of cross-subsidisation by transport undertakings, either on efficiency or redistributional grounds, provided the undertakings on the whole are able to break-even in financial terms.

Freedom to Transport Agencies to fix Fares and Freights

1.8.6 There is one other point of general interest on pricing. Once a pricing framework has been designed and approved for transport agencies, there should be minimum intervention from the Government. In the interest of efficient operation of our transport system we recommend that transport agencies should be left free as far as possible to set their own fares and freights, based on cost structure worked out by them, so long as they do not violate the broad pricing guidelines set by the Government.

1.9 Energy and Transport Policy

1.9.1 We are concerned about our heavy dependence in transpprt on petroleum products—a non-renewable resource. Transport consumes nearly a third of the country's oil and a substantial portion of diesel supplies. It is sometimes argued that the real resource constraint in determining an optimal inter-modal mix for the future should not be availability of monetary funds as shortages of oil supplies. Accordingly, it is suggested that the use of private cars and lorries should be discouraged and railways encouraged for energy conservation. There is no doubt that energy conservation will be the most important guiding principle in the framework for determining an optimal mix of our future transport system*.

1.10 Environmental Objectives

1.10.1 Finally, in framing a long-term transport policy for the country, we should not ignore the adverse impact of transport on environment. In India there is general lack of concern about environmental implications in regard to growth of transport, especially of road traffic. The problem is acute in our cities where travelling vehicles generate noise, fumes and often hideous visual intrusions, and result in accidents, personal stress and physical damage to the fabric of urban society. Where heavy lorries use approach roads or roads in residential areas, conditions worsen for the people.

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* For evidence on energy demand in the transport sector and relative energy efficiencies of the principal modes of transport in the country, see Chapter 3.

1.10.2 Much can be done to mitigate these nuisances. For example, appropriate regulations on lorry size and weight, noise and fumes can be an effective protection against environmental pollution. Similarly, sound traffic management and parking policies can reduce traffic congestion in the urban areas and bring about significant environmental gains. Effective land-use policies, which may promote desirable shifts in population and employment, can also improve the quality of urban environment. On our inter-city routes there is also a great opportunity for improving the qualiy of environment by planting trees and providing adequate wayside amenities. We urge upon the authorities, especially the State Governments and local bodies, to devise schemes for safeguarding the environment both on urban and inter-urban routes and integrate them with planning for development of a future national transport system.

Relationship between size and rate of growth of Investment in the Transport Sector and Gross Domestic Product in India : 1961-77.

1. The purpose of this exercise is to study whether there exists a significant association between the size and rate of growth of Gross Domestic Product (GDP) and Gross Capital Formation (GCF) in the transport sector. For this purpose time-series data on GDP and GCF at current prices were obtained for the period 1951-52 to 1976-77 from national income statistics. The relevant data are reproduced in table 1.1. The table indicates that the ratio of GCF in the transport sector to GDP showed an upward trend until 1962-63 after which it was reversed. The ratio ranged from 1.19 per cent during 1951-52 to 1.44 per cent during 1976-77 with a peak of 2.84 per cent in 1962-63.

2. To test the hypothesis regression analysis was carried out. In order to eliminate the effect of serial correlation, a time variable (t) was included as one of the independent variables. Both linear and loglinear models were tried. Linear regression gave better fits. The Pearson correlation coefficients between the relevant variables are presented in table 1.2.

3. It is observed from table 1.2 that GDP-GCF in transport sector and the growth rate of GDP are positively correlated with time. This implies a significant positive trend for GDP and transport investment over time. GCF in the transport sector and GDP are also positively correlated with lags up to two years. The correlation coefficients vary between 0.93 and 0 96. But GDP and the growth rate of transport investment or, alternatively, the growth rate of GDP and transport investment are not highly correlated. The two growth rates are also not significantly correlated.

4. Because of a high degree of inter-correlation between time and transport investment, the 't' values of the regression coefficients were very low. This led to poor estimation of the parameters of the model.

5. To test whether the effect of transport investment on GDP is spread over time, a distributed lag model was used. A Koyck model of distributed lag was hypothesized :

$$GDP_t = B_1(1-\lambda)\ GCF_t + \lambda\ GDP_{t-1} + W_t \quad (1)$$

The equation has two parameters B_1 and $\lambda (0 < \lambda < 1)$. The fitted regression line stands as

$$\underset{}{GDP_t} = -\underset{(0.43)}{10.14} + \underset{(17.04)}{0.996}\ GDP_{t-1} + \underset{(2.19)}{7.05}\ GCF_t \quad R^2 = 0.99 \ (2)$$

The above equation confirms that gross capital formation in the transport sector has a lagged effect on GDP, the effect declining over time in geometric progression the first term of which is 0.004 and the common ratio (indicating the rate of decrease) 0.994. The elasticity of GDP with respect to GCF is 0.14 which indicates that 1 per cent increase in GCF leads to an increase of 0.14 per cent in GDP.

6. The reverse impact of GDP on GCF in the transport sector was also tested by applying the same distributed lag model. The fitted regression line is given by :

$$GCF_t = \underset{(0\ 36)}{0.41} + \underset{(2.30)}{0.0016}\ GDP_t + \underset{(4.81)}{0.801}\ GCF_{t-1}. \quad R^2 = 0.95 \ (3)$$

Here the elasticity of transport investment with respect to GDP is 0.086.

Table 1.1

Gross Domestic Product at current market prices and Gross Capital Formation in the Transport Sector in India during 1951-52—1976-77 (figure in billion rupees)

Year	Gross Domestic Product (GDP)		Gross Capital Formation (GCF) in the Transport Sector		Percentage of GCF to GDP
	GDP	Growth rate	GCF	Growth rate	
1	2	3	4	5	6
1951-52	100.04	5.27	1.19	25.26	1.19
1952-53	97.41	—2.63	0.96	—19,33	0.99
1953-54	104.98	7.77	1.04	8.33	0.99
1954-55	98.11	—6.54	1,12	36.54	1.45
1955-56	103.67	5.67	1.87	31.69	1.80
1956-57	117.73	13.23	2.64	41.18	2.24
1957-58	120.05	1.97	3.28	24.24	2.73
1958-59	133.56	11.25	3.20	—2.44	2.40
1959-60	138.45	3.66	2.97	—7.19	2.15
1960-61	150.18	8.47	3.28	10.44	2.18
1961-62	159.77	6.39	3.99	21.65	2.50
1962-63	170.99	7.02	4.86	21.80	2.84
1963-64	196.56	14.95	5.38	10.70	2.74
1964-65	230.44	17.24	5.86	8.92	2.54
1965-66	241.12	4.63	6.64	13.33	2.75
1966-67	276.62	14.72	5.93	—10.69	2.14
1967-68	322.94	16.74	4.98	—16.02	1.54
1968-69	332.79	3.05	5.07	1.81	1.52
1969-70	368.51	10.73	5.14	1.38	1.39
1970-71	403.93	9.61	7.71	50.00	1.91
1971-72	435.31	7.77	8.06	4.54	1.85
1972-73	480.19	10.31	9.65	19.73	2.01
1973-74	591.88	23.26	10.43	8.08	1.76
1974-75	698.63	18.04	11.52	10.45	1.65
1975-76	738.80	5.75	12.64	9.72	1.71
1976-77	796.23	7.77	11.46	—9.34	1.44

Source : **National Accounts Statistics,** February 1975, October 1976 and January 1979 published by Central Statistical Organisation, New Delhi.

Table 1.2

Matrix of Pearson product-moment correlation coefficients between the size and growth of Gross Domestic Product and Gross Capital Formation in the Transport Sector during 1951-52 to 1976-77 in India.

Variables	Time	GDP (t)	GDP (t-1)	GDP (t-2)	GCF (t)	GCF (t 1)	GCF (t-2)	GR (GDP)	GR (GCF)
1	2	3	4	5	6	7	8	9	10
1. Time	1.00	0.92	0.91	0.91	0.95	0.94	0,94	0.49	—0.21
2. GDP (t)		1,00	0.90	0.99	0.95	0.96	0.95	0.39	—0.20
3. GDP (t-1)			1.00	0.99	0.94	0.95	0.95	0.32	—0.20
4. GDP (t-2)				1.00	0.93	0.95	0.94	0.32	—0.21
5. GCF (t)					1.00	0.97	0.95	0,47	—0.12
6. GCF (t-1)						1.00	0.98	0.47	—0.30
7. GCF (t-2)							1.00	0.46	—0.33
8. GR (GDP)								1.00	—0.14
9. GR (GCF)									1.00

Source of data : Table 1.1

Chapter 2

Transport Development In India : A Review

2.1 Introduction

2.1.1 Before dealing with the main theme of our report, namely, determination of an optimal inter-modal mix of traffic and problems of specific modes of transport, a brief review may be made of recent developments in the transport sector.

2.2 Public Sector Outlays and Expenditure in Transport under the Five Year Plans :

2.21 Between the First and the Sixth Five Year Plans the public sector outlay or expenditure in the transport sector increased from Rs. 434 crores to Rs. 8621 crores (in current prices), although the share of transport in total expenditure declined from around 23 per cent in the first three Five Year Plans to 14 per cent in the Fifth Plan and to only 12 per cent in the Draft 1978-83 Plan. The quantum of outlay or expenditure and its distribution since the First Five Year Plan is given in table 2.1 on page 14.

2.2.2 The share of railways in total public sector outlay for transport which stood at 66 per cent in the Second and 67 per cent in the Third Plan declined gradually to 37 per cent in the Fourth Plan and around 40 per cent in the Fifth and 1978-83 Plans. The share of roads ranged between 22 to 30 per cent of total outlay in most Plan periods, except during the Fourth Plan when it rose to 34 per cent. Road transport which had received a share of 1.4 per cent in the Third Plan accounted for 9 percent of the total transport outlay in the Fifth Plan. The development of major and minor ports accounted for only 3 per cent of the total outlay in the Second Plan but their share rose to 10.5 per cent in the Fifth Plan. The acquisition of shipping tonnage mainly for foreign trade increased from 2 per cent of transport outlay in the Third Plan to 8 per cent in the Fifth Plan. Similarly, 5 to 9 per cent of the outlays has been spent on civil aviation. Inland water transport has remained the most neglected mode of transport, accounting for only half of one per cent of total public sector transport outlay.

2.2.3 Variations in allocation of outlay obviously reflect the relative priorities in the Plans as well as the urgency to solve immediate problems faced by a particular mode of transport. Thus, in the First Plan, the main focus was on rehabilitation and replacement of overage assets of the railways and replenishment of old shipping tonnage. The Second or Third Plan gave priority to new railway construction programmes and to purchase of additional rolling stock as an integral part of the Plan strategy to enhance the tempo of the country's industrial development. Road development received a better deal in the Fourth Plan. The primary emphasis on port development programme was on rehabilitation and modernisation of major ports in the first two Plans. Schemes for additional new ports capacity were taken up, except for Kandla, only in subsequent Plans, but this has still not eased port congestion.

2.3 Growth of Transport

2.3.1 Despite sizeable expenditure, it is found that the tronsport sector capacity has continuously lagged behind requirements of the economy. The bulk of transport requirements have been met by railways and road transport, although other modes of transport, namely, civil aviation, coastal shipping, inland water transport and pipelines, also had a share in it.

Railways

2.3.2 With the addition of about 7,000 kms. of new lines since 1950-51, including restoration of

Table 2.1

Public Sector Expenditure or Outlay on Transport Sector

(Rs. crores)

Sl. No.	Sub-Sector	First Plan 51-56 (Expr.)	Second Plan 56-61 (Expr.)	Third Plan 61-66 (Expr.)	Annual Plans 66-69 (Expr.)	Fourth Plan 69-74 (Expr.)	Fifth Plan 74-79 (Outlay)	1974-78 Expr.	Revised Draft Sixth Plan 78-83 (outlay)
1	2	3	4	5	6	7	8	9	10
1.	Railways	217 (50.0)	723 (65.7)	1326 (66.9)	509 (49.3)	934 (37.0)	2202 (40.6)	1523 (37.4)	3400 (39.4)
2.	Roads			440 (22.1)	309 (30.0)	862 (34.1)	1353 (25.0)	1198 (29.4)	2599 (30.1)
3.	Road Transport	147 (33.8)	242 (22.0)	27 (1.4)	55 (5.3)	128 (5.1)	461 (8.5)	368 (9.0)	751 (8.7)
4.	Ports including Minor Ports	28 (6.5)	33 (3.0)	93 (4.7)	53 (5.1)	249 (9.8)	571 (10.5)	421 (10.1)	436 (5.1)
5.	Shipping	19 (4.4)	53 (4.8)	40 (2.0)	32 (3.1)	155 (6.1)	450 (8.3)	343 (8.4)	660 (7.7)
6.	Inland Water Transport			4 (0.2)	6 (0.6)	11 (0.4)	32 (0.6)	12 (0.3)	44 (0.5)
7.	Light houses			4 (0.2)	2 (0.2)	6 (0.2)	14 (0.3)	8 (0.2)	16 (0.2)
8.	Civil Air Transport	23 (5.3)	49 (4.5)	49 (2.5)	66 (6.4)	177 (7.0)	337 (6.2)	214 (5.2)	715 (8.3)
	Total Transport	434 (100.0)	1100 (100.0)	1983 (100.0)	1032 (100.0)	2522 (100.1)	5420 (100.0)	4078 (100.0)	8621 (100.0)
	Total Plan (All Sectors)	1960	4672	8577	6652	15779	39322	28991**	71000
	Expend. on Transport as % of total Plan Expend.	(22.1)	(23.5)	(23.1)	(15.6)	(16.0)	(13.8)	(14.1)	(12.1)

**Anticipated expenditure.

Note : (1) Figures in brackets are percentages.

(2) Figures under 3—Road Transport, 5—Shipping, 6—Inland Water Transport do not include private investments in vehicles, vessels etc.

dismantled lines, the rail network today extends over nearly 60,700 kms, 30,900 broad gauge, 25,500 metre gauge and 4,300 narrow gauge lines. Of the railway route sections, 47,900 kms. are single line, nearly 12,300 kms. double line and 450 kms. more than two lines. The running track kilometerage increased from 59,315 in 1950-51 to 75,012 in 1977-78.

2.3.3 The growth of passenger as well as goods traffic on the railways has been much faster than of rail capacity. Between 1950-51 and 1977-78 the total passenger traffic increased from 66.5 to 177 b. passenger kms., and freight traffic from 44 to 163 b. tonne kms. Most of the traffic is concentrated in the quarter of rail network, which accounts for 75 per cent of freight and 55 per cent of passenger traffic.

2.3.4 The suburban rail services, concentrated mainly in the three metropolitan cities of Bombay, Calcutta and Madras, have multiplied as much as six times between 1950-51 and 1977-78, from 6.55 to 39.43 b. passenger kms. The growth of non-suburban traffic has been comparatively modest, having no more than doubled, from 59.97 to 137.27 b. passenger kms. in these years.

2.3.5 With the emphasis in the Plans on growth of agricultural and industrial sectors, it is understandable that freight traffic on railways should have registered a four-fold increase in terms of tonne kms. between 1950-51 and 1977-78. Nine bulk commodities, coal, foodgrains, iron and steel, iron ore, cement, mineral oils, chemical and manures, salt and limestone and dolomite, continued to account for nearly 80 per cent of traffic on the railways.

Roads and Road Transport

2.3.6 Next to railways, road transport plays a key role in the country's transport system. It provides the only means of mechanised transport in hilly, rural and backward areas which are not connected by rail. Road development plans have broadly followed the approach of the Nagpur Road Plan in the post-war reconstruction phase and under the First and Second Plans, and the Bombay Road Plan for 1961-81. The latter Plan envisaged that road length in the country would increase from 3.79 lakh miles (6.09 lakh kms) in 1961, to 6.57 lakh miles (10.51 lakh kms) in 1981, of which 40 per cent would be surfaced.

2.3.7 The total road length in the country increasd between 1950-51 and 1975-76 from 3.98 to 13.84 lakh kms. The total road length in 1975-76 included 28,870 kms. of national highways and 97,700 kms. of state highways, the balance comprising district, village or rural, urban, project roads, etc. About 5.46 lakh kms., or nearly 39 per cent of total road length, in 1975-76, constituted surfaced road length.

2.3.8 The development of rural roads was given priority in the Fifth Plan when a specific outlay was provided for it under the minimum needs programme. It was then proposed that a link road should be provided to all villages with a population of 1,500 or above. The position as at the end of 1977-78 has been explained elsewhere.*

* See Chapter 10.

As against a total number of 5.76 lakh villages in the country, only about 29 per cent had all-weather roads and 16 per cent fair weather road connections as on 31 March 1978. The number of villages which remain to be connected with any road is 3.14 lakh and those with an all-weather road is over 4 lakh; 84 per cent of which fall in the category of those with less than 1,000 population.

2.3.9 The total number of motor vehicles registered a ten-fold rise in the country, from 3.06 lakh in 1950-51 to 32.36 lakh vehicles in 1977-78. Of these, two-wheelers and three-wheelers have increased from about 27 thousand in 1950-51 to about 15 lakh in 1977-78. The number of buses increased from 34,411 to 117,449 and trucks, by a still higher figure, from 81,888 to 368,193 in these years. Out of 117,449 buses registerd in the country 58,128 or 49.5 per cent of the total strength are owned by the public sector road transport undertakings and the remaining 59,321 or 50.5 per cent by the private sector. The ownership of trucks is almost entirely with the private sector, the nationalised sector accounting for only 1827 trucks or 0.5 per cent of total truck fleet registered in 1977-78.

2.3.10 Precise data on the traffic served by road tranport, particularly by trucks, is not available. It is, however, estimated that the passenger traffic by road has increased from 23 to 250 b. passenger kms. between 1950-51 and 1977-78. Similarly, freight traffic by road is estimated to have increased from 5.5 to 77 b. tonne kms. in this period.*

Inland Water Transport

2.3.11 India's navigable inland waterways extend over nearly 14,500 kms. and comprise a variety of river systems, canals, backwaters, creeks and tidal inlets. The navigable length of important river system in the country is about 8,973 kms., of which only 2,498 kms, are navigable by steamers. Andhra Pradesh, Assam, Bihar, Kerala and Uttar Pradesh offer relatively greater potential for development of the inland water transport system. Most of the waterways, however, suffer from navigational handicaps like shallow water and narrow width during dry weather, siltation and bank erosion. Because of these constraints, only about 5,200 kms or half the river length of the major rivers and 485 kms of canals are suitable for mechanized crafts. No accurate estimate of traffic carred by IWT system is available. However, Goa accounts for the largest proportion of total originating traffic, the bulk of which consists of iron ore. Traffic in Kerala consists mostly of clay and sand, coir, bricks, tiles and fertilizers.**

Coastal Shipping

2.3.12 India has a long coastline of 5,660 kms. It has 178 ports, 10 of them being major ports and 168 minor ports, including 23 intermediate ports. Coastal shipping has, stagnated, however, and the traffic handled between 1951-78 declined progressively.***

2.3.13 The total coastal shipping tonnage increased between 1951-76, from 2.17 to 4.42 lakh GRT but declined thereafter to 4.00 lakh GRT in 1978. The reduction occurred mainly on account of a substantial fall in the number of dry cargo vessels. Whatever increase in GRT that had occured was due to increase in the number and size of oil tankers. The total volume of traffic carried by coastal shipping increased between 1951-62 from 25.2 to 64.2 lakh tonnes (41.0 lakh tonnes of dry cargo and 23.2 lakh tonnes of wet cargo) but thereafter it progressively declined, reaching a level of 37.4 lakh tonnes (15.5 lakh tonnes of dry cargo and 21.9 lakh tonnes of wet cargo) in 1975. Figures for the subsequent period are available only in respect of dry cargo, the coastal movement of which declined further to 10.9 lakh tonnes in 1978. The main items of dry cargo handled by coastal shipping are coal and salt.

Air Transport

2.3.14 Domestic air services operated by the Indian Airlines after nationalisation in August 1953 registered a spectacular expansion over the

* See chapter 11 for further details.

** See chapter 15.

*** Also see chapter 14.

last two decades. The main business of Indian Airlines is passenger traffic, the number flown having increased from 0.79 to 4.37 m. between 1960-61—1977-78. In terms of revenue passenger kilometres (RP kms) traffic has increased from 614 m. RP kms. in 1960-61 to 3389 m. RP kms. in 1977-78. In terms of revenue tonne kms. (RT kms) covering passengers, cargo, mail and charters, traffic has increased from 83.20 million RT kms. to 324.96 m. RT kms. in 1960-61 and 1977-78.

2.3.15 Domestic air traffic has been continuously increasing at a rate of around 12-15 per cent each year. In fact, in the last two years the growth rate was even higher, 16 per cent in 1977-78 and 20 per cent in 1978-79. Most of the traffic is concentrated on trunk routes which account for 65 per cent of the total traffic. Other busy operational sectors are the North-East, Bombay-West coast and the Saurashtra regions where the demand for air transport has increased since the surface modes of transport are not adequately developed.

2.3.16 Indian Airlines has increased its capacity from 113 m. available tonne kms. (AT kms.) in 1960-61 to 481 m. AT kms, in 1977-78. In available seat kms. (AS kms.), the capacity increased from 864 m. AS kms. in 1960-61 to 4806 AS kms. in 1977-78. Over the years, the fleet mix of Indian Airlines has undergone a major change. Piston-engined aircraft have been phased out and now low capacity turbo-prop aircraft are being replaced by high capacity jet aircraft. Accordingly, the total number of aircraft has declined from 99 in 1953-54 to 48 in 1977-78. About 85 per cent of available seat kms. today are provided by Boeing 737 and Air Bus (AB-300).*

2.4 Trends in Traffic

2.4.1 A significant development in the transport sector is the marked shift in the relative share of rail and road transport in total traffic carried during this period. The share of road transport in both passenger and goods traffic increased at a much faster rate than of railways, although in absolute terms traffic increased substantially on both modes of transport.

2.4.2 The railways accounted for 89 per cent of total freight traffic and 74 per cent of total passenger traffic carried by rail and road in 1950-51. The respective shares declined to 65 per cent and 40 per cent by the end of the Fourth Plan (1973-74). The share of road transport increased from 11 per cent of freight traffic and 26 per cent of the passenger traffic in 1950-51 to 35 per cent and 60 per cent respectively in 1973-74. Thereafter, the share of rail and road transport has been generally in the ratio of 67:33 for freight and 40:60 for passenger transport. The growth and relative share of rail and road transport in goods and passenger traffic is shown in table 2.2.

Table 2.2

Traffic Carried by Rail & Road

(i) Freight Traffic

(Billion T Kms)

Year	Traffic carried by Rail	Traffic carried by Road	Total	Percentage share Rail	Percentage share Road
1	2	3	4	5	6
1950-51	44.1	5.5	49.6	89	11
1955-56	59.6	8.9	68.5	87	13
1960-61	87.7	35.0	122.7	71	29
1965-66	116.9	55.0	171.9	68	32

* See chapter 13.

1	2	3	4	5	6
1968-69	125.1	64.0	189.1	66	34
1970-71	127.4	66.0	193.4	66	34
1973-74	122.4	67.0	189.4	65	35
1974-75	134.3	71.0	205.3	65	35
1975-76	148.3	73.0	221.3	67	33
1976-77	156.8	76.0	232.8	67	33
1977-78	162.7	77.0	239.7	68	32

(ii) Passenger Traffic*

(Billion P Kms)

Year	Rail	Road	Air	Total Rail+Road	Percentage share Rail	Percentage share Road
1	2	3	4	5	6	7
1950-51	66	23	—	89	74	26
1955-56	62	31	0.3	93	67	33
1960-61	78	57	0.6	135	58	42
1965-66	96	95	1.0	191	50	50
1968-69	107	140	1.4	247	43	57
1970-71	118	169	—	287	41	59
1973-74	136	208	1.9	344	40	60
1974-75	126	219	2.6	345	37	63
1975-76	149	225	2.6	374	40	60
1976-77	164	235	2.9	399	41	59
1977-78	177	250	3.4	427	41	59

* Passenger trafic by road upto 1964-65 have been taken from the report of the Committee on Transport Policy and Coordination. The traffic for 1976-77 has been calculated on the basis of the number of buses, the actual performance of public sector buses and assuming the performance of private seetor buses at 66% of the public sector on account of short distance routes of operation and an older composition of fleet. The traffic between 1964-65 and 1976-77 has suitably been built up by gradually increasing average annual performance of buses.

SOURCE : Indian Railways Year Book and Plan Documents.

Trends in Goods Transport

2.4.3 Railways and road transport account most forof the freight traffic in the country. Traffic carried by these modes increased from 49.6 to 239.7 billion tonne kilometres in 1950-51 and 1977-78, or by 4.8 times during this period. The growth of freight traffic in relation to that of national income and certain selected economic indicators is shown in table 2.3. These data reveal that in the first two decades, following the Five Year Plans, the rate of growth of freight traffic was nearly twice as much as of national income, the transport requirements having thus increased at a much higher rate than industry, mining and other sectors. The growth of freight traffic, however, tapered off during the last decade, with freight traffic growing at the same rate as national income.

Table 2.3

Indices of Growth of Freight Traffic and Economic Trends

(Base 1970-71=100)

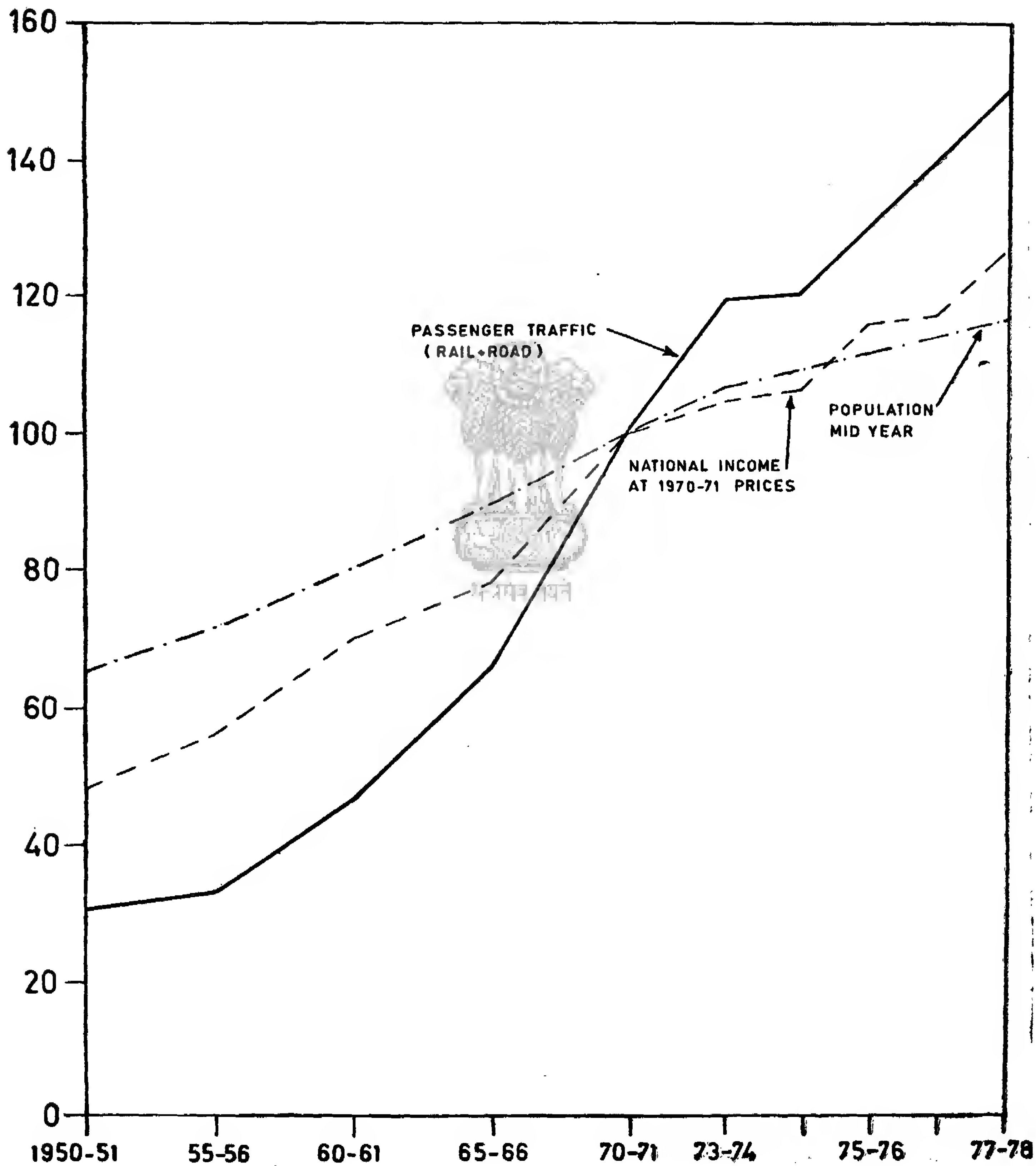
Year	Freight Traffic (Rail + Road)	National Income	Industrial production	Mineral Production	Agricultural Production
1	2	3	4	5	6
1950-51	25.6	48.8	—	—	52.2
1955-56	35.4	57.9	38.6	45.0	63.9
1960-61	63.4	70.3	54.3	58.0	77.8
1965-66	88.9	78.9	83.4	80.0	72.5
1970-71	100.0	100.0	100.0	100.0	100.0
1973-74	97.9	105.1	112.0	107.0	100.8
1974-75	106 1	106.2	114.3	114.0	97.6
1975-76	114.4	115.9	119.7	128.0	112.4
1976-77	120-4	117.5	131.4	137.0	104.5
1977-78	123.9	126.5	138.3	138.0	119.0

Note : 1. The base year for cols. (4) & (5) is calendar year 1970, thus the 1970-71 figures show those pertaining to the calendar year 1970 and so on.

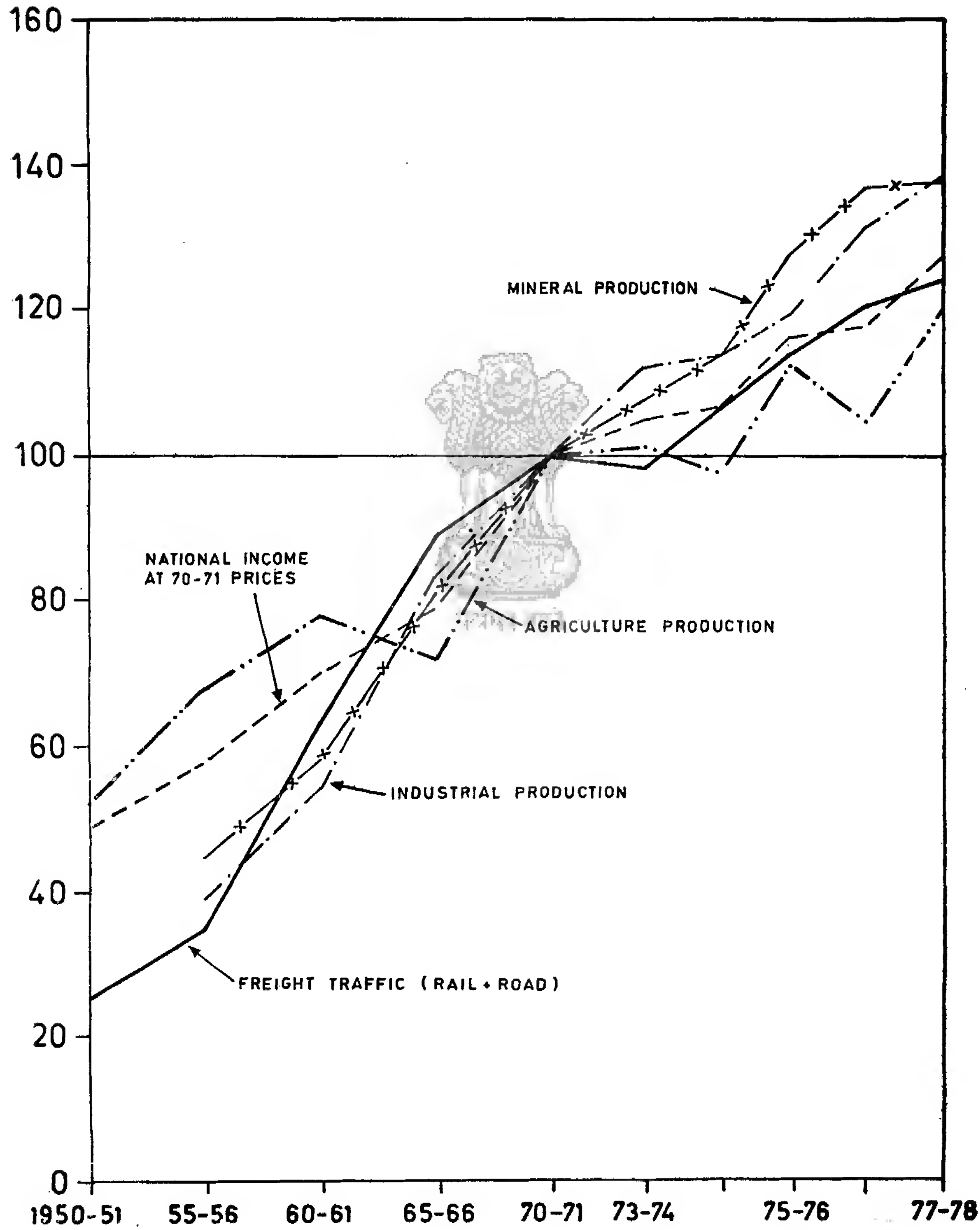
2. The base year for figures in col. (6) relates to the triennium ending 1969-70. For comparison these figures have been converted to 1970-71=100

Source : *Statistical Abstract*, Central Statistical Organisation.

INDICES OF PASSENGER TRAFFIC AND ECONOMIC TRENDS



INDICES OF FREIGHT TRAFFIC AND ECONOMIC TRENDS



2.4.4 The bulk of of freight traffic carried by rail comprises mostly goods like coal, iron and steel, cement, fertilisers and petroleum products, the proportion of which has increased from 55 per cent to around 80 per cent of total rail freight traffic in 1950-51 and 1977-78. The traffic in general goods has remained more or less stationary, fluctuating between 45 and 50 million tonnes in the period 1960-61-1977-78. An increasing proportion of traffic in manufactured or high value products has gone over to road transport which has been carrying this traffic over progressively longer distances.

2.4.5 Not only has the volume of originating traffic carried by rail undergone a sharp increase; the average lead of freight traffic by rail has also risen considerably. For example, the average lead which was 470 kms. in 1950-51 increased to 686 kms. in 1977-78* Information on traffic composition carried by road transport and traffic lead is not available for previous years.

Trends in Passenger Transport

2.4.6 As it is shown in earlier tables, the two modes of transport, namely, rail and road, account for most of passenger traffic. Air transport also provides an effective alternative for long distance traffic, although it constitutes a relatively small proportion of total passenger kilometers moved in the country. A large percentage of traffic carried by air transport over longer hauls is accounted for by pairs of points like Delhi-Bombay, Calcutta-Delhi, Bombay-Bangalore and Madras-Delhi. Data on growth of passenger traffic by road and rail in relation to that of population as well as of national income are given in table 2.4. The rate of growth of passenger traffic has been much higher than growth rates of population and national income.

Table 2.4

Indices of Passenger Traffic & Economic Trends

(Base 1970-71 = 100)

Year	Passenger Traffic Rail+Road	National Income at 1970-71 prices	Population (Mid-year)
1	2	3	4
1950-51	31.0	48.8	65.5
1955-56	33.1	57.9	71.6
1960-61	47.0	70.3	80.2
1965-66	66.5	78.9	89.5
1970-71	100.0	100.0	100.0
1973-74	119.9	105.1	106.7
1974-75	120.2	106.2	109.1
1975-76	130.3	115.9	111.2
1976-77	139.0	117.5	113.6
1977-78	149.5	126.5	115.8

* Commoditywise data on traffic lead by rail are given in Chapter 9.

Notes : Figures in col. 4 refer to the mid-year population. Thus the 1950-51 figures relate to the mid-year estimates of 1951 and so on.

Source : Statistical Abstract, Central Statistical Organisation.

2.4.7 Passengers travelling in second class accommodation constitute over 95 per cent of total passenger traffic of the Indian railways. For long distance travel, there is no cheaper or quicker alternative mode of transport than the railways, especially for those who choose to travel in second class. For short distance travel, however, roadways provide better service. Urban transport services are by and large provided by buses, except in the three major metropolitan cities of Bombay, Calcutta and Madras, where suburban services offered by the railways make a significant contribution.

2 4.8 Both passenger and freight traffic have grown at the same rate over the period under review. Freight traffic, for example, grew by 4.7 times and passenger traffic 4.8 times in the period 1950-51—1976-77. Growth of passenger traffic by road has, however, been faster than by rail. As regards rail passenger triffic, suburbant raffic has grown faster than non-suburban traffic. Excluding suburban traffic, the share of short and long distance traffic has undergone a significant change. For example, short distance traffic, represented by ordinary passenger trains, increased at a relatively lower rate than long distance traffic, representing traffic by mail or express trains. The share of short distance traffic which stood at about 60 per cent of total passenger traffic in 1960-61 declined to only 47 per cent in 1977-78. The rate of growth of long distance traffic has been around 6 to 7 per cent per annum as againt 2 per cent for short distance traffic.

2.4.9 Reliable data are not readily available for passenger traffic by road transport. However, some data available for nationalised portion of passenger traffic show that the share of public sector buses in passenger transport has been increasing steadily, the number of buses with state transport undertakings having increased from 17,962 in 1960-61 to 58,128 in 1977-78.

2.5 Imbalances in the Transport System

2.5.1 Despite continuous efforts made since 1951 to augment the capacity of various modes of transport, the transport sector has generally experienced bottlenecks and capacity shortages. The imbalance between demand and supply of transport facilities has adversely affected the smooth functioning of the economy. During the last decade, in particular, the growth of transport capacity lagged behind requirements of the economy, so much so that difficulties and problems arose in almost every part of the country in regard to movement of essential commodities needed for industrial and agricultural development and for meeting consumer needs of the community.

2.5.2 The burden of transport has been naturally borne by railways which recorded a four-fold increase in freight traffic without commensurate investment in rolling stock or line haul capacity, resulting in bottlenecks, a major issue in transport planning policy. The most difficult problems faced by railways were in relation to movement of commodities like coal from Bengal-Bihar coalfields, foodgrains from northern India to destinations in the southern and eastern India and cement from southern to northern India. These difficulties were experienced particularly during the last decade, one of the causes being the changed pattern of freight movement by rail. For example, when foodgrains were being imported, traffic flow in this commodity was from ports to consuming States in the northern and eastern parts of the country. With self-sufficiency in foodgrains, the traffic pattern has changed, foodgrains now moving from the northern States to destinations in the southern and eastern regions. Similarly, the decision to import cement also placed additional strain on railways for transporting this commodity from ports to consuming centres in the north. Had there been sufficient resilience in the railway system, these unforeseen shifts in traffic pattern could have been handled without creation of any bottlenecks. Apart from pressure on railways on account of sudden shift in the traffic pattern, the rail system had also to cope from time to time with dislocations caused by floods and other natural calamities. Some resilience in the system is necessary to deal with such unforeseen occurrences. The rail system has also been under pressure for movement of passenger traffic, particulaly on long-distance and suburban routes, notwithstanding addition of a number of new trains.

2.5.3 Mechanized road transport comes next to railways as a means of transport for movement of people and goods. Although there has been a steady growth in the number of commercial vehicles in the country, there was at times an acute

shortage of trucks, particularly when the railway system was under heavy strain and was unable to cope with traffic demand.

2.5.4 The imbalance in supply and demand of transport was not only confined to the rail and road system; major ports, particularly the port of Bombay, also experienced frequent spells of congestion and consequently longer waiting periods for berths. Port congestion is estimated to have cost the national economy a large amount of money on account of demurrage charges and lost output due to delays in clearing essential cargo at ports.

2.5.5 Not only did these imbalances cause suffering and inconvenience to travelling public but the progress of the country's development programme was also affected adversely. All this underlines the need for creating adequate transport capacity much ahead of traffic demand, so that some cushion in the system exists to meet unexpected spurts or shifts in transport requirements.

2.6 New Evidence on Traffic Flows

2.6.1 A major handicap faced in framing an integrated transport policy in India is lack of reliable data on inter-regional traffic flows and comparative transport costs by different modes. A few surveys were conducted in the past to fill these data gaps, but none of them was comprehensive enough to provide meaningful information for evaluation of transport proposals for regional economic analysis. Recently, however, the Planning Commission entrusted to Rail India Technical and Economic Services Limited (RITES) a study on comparative modal costs and traffic flows as part of a UNDP Transport Policy Planning Project. Information collected for this study has given us valuable insight into the pattern of commodity flows by the three major modes of transport, namely, rail, road and coastal shipping, and their comparative movement costs.

2.6.2 Rail flows are based on complete coverage in as much as all computerised invoices for 1978-79 were processed. Coastal shipping traffic flows are based on data obtained from the Director General, Shipping, pertaining to 1977. For road transport data pertains to a sample of observations established through origin-destination (OD) survey, conducted by RITES in 1978-79. This survey was designed to cover all the 400 districts in the country. However, since certain districts had extremely low potential for commodity flows on account of low economic activity and population density, some of them were clubbed together, so that finally 298 regions were selected, each region broadly corresponding to a district. To collect information on freight traffic by roads from these nodal points, a network of 216 checkposts was selected covering all the routes on national and state highways.

2.6.3 In view of seasonal variation in traffic flows, it was decided to conduct two rounds of traffic surveys of roads. During the first round (held between November 1978—February 1979) 3.7 lakh trips performed by 1.53 lakh individual goods vehicles were intercepted. These individual goods vehicles constituted 38 per cent of the total goods vehicles fleet of 3.67 lakh in the country. The present analysis is based on data collected in the first round.

2.6.4 For purpose of the study, all commodities transported were clubbed into 37 groups. Each group consists of a commodity or a group of commodities possessing homogenous transport characteristics. Commodity flows were studied under 30 "distance" slabs and by mode of transport. The distances are arranged into 50 km. slabs up to a distance of 1,000 kms,, 100 km; slabs up to a distance of 2,000 kms., and all above 2001 kms.

Present Traffic Flows

2.6.5 The total inter-regional* freight traffic for 1978-79 by the three modes of transport, namely, railways, road and coastal shipping, is assessed at about 276 m. tonnes, originating on the entire route network, involving 183 b. tonne kms. This excludes the intra-regional (that is, intra-district) and intra-urban traffic, which is essentially short-haul and carried predominantly by road.

2.6.6 The inter-modal share of inter-regional traffic is indicated in table 2.5.

* A region in this study practically corresponds to an administrative district, with the exception of a few economically under-developed districts which have been clubbed.

Table 2.5

*

Estimated Inter-Regional* Freight Traffic, 1978-79, Inter-modal Share

(In millions)

Mode	Tonnes originating In Tonne	% share of the mode	Tonne-Kms In Tonne Kms.	% share of the mode	Average lead (in Kms.)
1	2	3	4	5	6
Railways	184.0	66.7	1,48,689	81.2	808
Roads	91.0	33.0	32,171	17.6	354
Coastal Shipping	0.7	0.3	2,186	1.2	2,988
	275.7	100.0	1,83,046	100.0	—

The table shows that, in total inter-regional traffic, the rail share is 67 per cent and 81 per cent in terms of tonnes and tonne kms. respectively. The road share is 33 per cent and 18 per cent with coastal traffic accounting for an insignificant share of 0.3 per cent and 1 per cent of total tonnes and toone kms. respectively. The average lead of traffic carried by road is 354 kms., by railways 808 kms., and coastal traffic 3,000 kms. The traffic in originating tonnes on the roads is almost 50 per cent of that of railways. The share in terms of tonne-kms. is less than 18 per cent for roads and as much as 81.2 per cent for railways. The average lead of road transport at 354 kms. is less than half of that for raiways at 808 kms.

2.6.7 Coastal traffic is unique in itself. First, it is confined to a few low-rated bulk commodities and, secondly, average leads involved are much longer than rail and road transport. Coal and salt predominate. These two commodities in 1977 accounted for over 85 per cent of originating tonnes and 95 per cent of tonne-kms.

2.6.8 Major traffic flows on railways for other than bulk commodities in train loads, accounting for over 100,00 tonnes annually, moved between 64 regions, involving 35 origins and 34 destinations, between which one train can be scheduled to run at least every fifth day. Traffic flows of over 50,000 tonnes involved 76 origins and 80 destinations between which a minimum of 1 train can be run every tenth day.

2.6.9 For inter-regional flows of road traffic, there are 40 important pairs of points, which account for about 57 per cent of total road traffic. Of these pairs and regions, nine metropolitan cities alone handle about 30 per cent of total tonnage. The relative importance of each of these cities in relation to total traffic is shown in table 2.6.

* A region in this study practically corresponds to an administrative district, with the exception of a few economically under-developed districts which have been clubbed together.

Table 2.6

Estimated Inter-Regional Road Traffic Handled In Metropolitan Cities, 1978-79

City	Originating		Terminating		Total	
	(in 000 tonnes)	% to the total originating road traffic	(in 000 tonnes)	% of total terminating road traffic	(in 000 tonnes)	% of total road traffic
1	2	3	4	5	6	7
Ahmedabad	2446	2.69	2336	2.57	4782	2.63
Bangalore	2791	3.07	2319	2.55	5110	2.81
Bombay	5359	5.89	6299	6.93	11658	6.41
Calcutta	4106	4.52	2632	2.90	6750	3.71
Delhi	3871	4.26	3890	4.28	7761	4.27
Hyderabad	1570	1.72	1125	1.24	2695	1.48
Kanpur	1223	1.36	1055	1.16	2288	1.26
Madras	4634	5.10	5172	5.69	9806	5.39
Pune	983	1.08	869	0.95	1852	1.02
Total	26993	26.69	25697	28.27	52690	28.98
All India Total	90912		90912		181824	

2.6.10 The commodity composition of traffic (in 37 homogenous groups) shows that minerals, coal, iron and steel, salt, cement, mineral oils, fertilizers, stones and products of agriculture have preference for rail, with very low share of traffic overflowing to road. The road share of each of these commodity groups is below 20 per cent. Nine commodity groups comprising automobiles and parts, milk and milk products, cotton manufactured, tea and coffee, paints and dyes, cycles and cycle parts, fruits and vegetables and commodities consisting largely of manufactured articles predominantly move by road. The road share of these commodity groups varies between 70 per cent to 96 per cent. There are about ten commodity groups, such as electrical equipment, leather manufactured, hides, skin and bones, edible oils, chemicals and drugs, non-ferrous metals, livestock, tyres and tubes, and machinery equipment, which are shared almost equally by rail and road transport. The inter-modal shares vary between 40 and 60 per cent.

2,6.11 The average lead for commodities moving on railways are comparatively longer than road movements. Within the modes, most commodities moving by road are centered around

an average lead of 300 kms. A few commodities, namely, tea and coffee, cycle and cycle parts, tyres and tubes, machinery and equipment, automobile parts, paints, and dyes, however, have comparatively longer leads of over 500 kms. About 30 per cent of inter-regional traffic moves over an average lead of 700 kms. Among low-value bulk commodities moving by road, coal movement seems to be unusual, which might have resulted from wagon shortages. The average lead of inter-regional rail movement is around 800 kms. The high-value commodities have longer leads above 1000 kms.

Chapter 3

Determination of Optimal Inter-Modal Mix

3.1 Approach to Problem

3.1.1 We have stated earlier* that the central issue of transport policy is to allocate rationally and at minimum resource cost the total available resources for investment between various modes of transport to match with growing requirements of the economy. In the central issue, the core problem is to measure resource costs of each agency of transport on a comparable basis. But resource costs cannot be measured in isolation from Government's socio-economic, priority objectives or financia. constraints In fact, these objectives and constraints determine what elements should be included in computation of costs and what premia should be attached for shadow pricing of scarce resources like energy and other inputs consumed by the transport facility.

3.1.2 The sole criterion for determining an optimal inter-modal mix, however, is not merely minimisation of resource costs. There may be other important policy objectives which through its transport policy Government may want to pursue at a given point of time. For example, the Terms of Reference of this Committee specify that we should keep in view the need for generation of maximum employment potential in the country. Moreover, as transport is one of the principal energy users, particularly of petroleum products and as different modes have varying energy intensities, one of our basic objectives would be to promote, in the light of operational capabilities, those modes which have relatively high energy efficiency per unit of transport output. Two other considerations relevant for determining an optimal inter-modal mix are the emphasis on building rural roads to provide the much-needed accessibility for villages hitherto unconnected to a road system, and dispersal of industrial locations to new centres of activity in rural areas to optimise land-use and relieve congestion in large urban centres.

3.1.3 It is possible for Government for valid reasons to take into account at any time a non-efficiency (socio-political) objective as well in determining an appropriate inter-modal mix for the country. Nevertheless, it is our considered view that, while allocating investment outlay between transport modes, efficiency considerations should prevail, that is, our policy should be to create a transport system which provides service at the lowest resource cost to society.

Employment objective

3.1.4 In line with this approach we do not consider it correct to aim at expansion of employment when we evolve criteria for allocation of investment between various modes of transport. Important as employment generation is in all programmes of development, its role in influencing the choice of transport mode is minimal. For, the concern with maximisation of employment, prima facie, might lead to a choice of mode which is labour-intensive per unit of investment outlay but is not equally efficient. However, the choice is not so simple, as the most labour-intensive mode could be the most inefficient from the point of view of transport service.

3.1.5 Actually, in an interdependent economy such as ours, the efficiency of transport services has to be measured in terms of its capability of fulfilling production and hence employment targets of other sectors within a specified time-frame. Instead of creating more job opportunities a modal choice based on employment generation may consequently jeopardise the whole

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* See Chapter 1.

production and employment generation programme of the economy by failing to provide essential transport services efficiently and on time. In cur view, therefore, it will be sensible not to mix up employment objective with the issue of choosing an efficient transport system for the country while allocating funds between various agencies of transport.

Energy conservation

3.1.6 The transport sector uses nearly a third of the country's total commercial energy and more than half of its oil supplies. The composition of fuel consumption in the transport sector has changed as is shown in the table belcw :

Table 3.1

Composition of Fuel Consumption 1953-76

(in percentage)

	1953-54	1960-61	1975-76
Coal	56	47	17
Oil	41	51	81
Electricity	3	2	2

While the share of electricity in energy consuption in transport sector has remained unchanged at around 2-3 per cent in the period 1953-54 to 1975-76, the share of oil has increased by 40 per cent, entirely at the cost of coal. Among principal modes of transport, only the railways use all the three forms of commercial energy, namely, coal, petroleum and clectricity. All other modes, including road and air transport, and coastal shipping, depend totally on petroleum fuel for traction energy. Rail and road transport together account for as much as 95 per cent of fuel oil used in the transport sector.

3.1.7 India presently consumes nearly 30 million tonnes of petroleum products, of which more than two-thirds are imported. In 1970-71, India spent 9.5 per cent of export trade earnings on oil imports. This increased to 28 per cent in 1975-76 and is provisionally placed at 50 per cent for 1979-80. According to projections of the Working Group on Energy Policy (1979), India's export earnings are expected to increase to Rs. 20,823 crores by the year 2000-01 A. D. from the present level of less than Rs. 6,000 crores, of which Rs. 15,470 crores or 74 per cent are likely to be spent on oil imports. These figures are based on time-trend (reference level) forecasts of oil demand, worked out by the Working Group and on the basis of oil prices of U. S. dollar 18 a barrel. As OPEC oil prices have already risen to dollar 30 a barrel, all this presents a dismal picture of India's energy situation by the turn of the century with consequential serious implications for balance of paymentsp osition.

3.1.8 There are two general policy considerations which flow from what has been stated in the foregoing paragraphs. First, as India. according to present surveys, has limited oil reserves but is fairly richly endowed in coal and hydro potential, the modal mix developed should broadly conform to future pattern of energy supply in the country. Clearly, this implies that the modal mix should favour modes using electricity as a motive power, which can be obtained from a variety of sources, ranging from nuclear fuels to hydro and solar energy. The point to underscore here is that India has not only adequate reserves of coal (only 10 per cent of hydro potential for power generation has been exploited) but also that the country's commercial energy base in future will mainly be electricity, and this position must be fully reflected in the development of our transport.

3.1.9 The second policy consideration is that as modes of transport have varying energy efficiencies, we should choose those which yield maximum transport service per unit of energy consumption.* Measurement of energy efficiency of transport is a difficult task complicated by the methodological question on whether the inter-modal mix should be determined on the basis of energy coefficients given in physical units or on shadow prices of energy used for computing resource cost. While we have examined energy efficiencies of various modes, the break-even points used for determining their respective shares in total projected

*Consumption data on energy efficiency is given in section 3·3.

traffic are based on resource-cost analysis which uses shadow value of energy. Data on energy intensities give information on energy used both for propulsion and non-propulsion purposes and, in that sense, it is more comprehensive and realistic for inter-modal comparison than resource-cost analysis which attaches shadow prices to propulsion energy only. We hold the view that in choosing an appropriate modal mix for the country's transport system, including choice of technological possibilities within each transport sector, energy conservation, particularly saving of fuel oil, must, other things being equal, receive priority.

3.1.10 A caveat may be entered to what wet have stated above. In an integrated transpor system, each mode has its distinctive function to perform. A railway system, efficient though it may be in energy terms, cannot reach every nook and corner of the country. Travelling has its own 'disutility factors' in which time and comfort may weigh considerably with travellers, which govern their choice of modes. Door-to-door accessibility may, therefore, be considered a worth-while objective to attain within certain limits and, for this, road transport, which is geographically more pervasive, will have to be developed, even though energy-wise it may be less efficient. The accessibility value also has guided our approach to development of rural roads. Similarly, air transport which, in energy terms, is the least efficient will have its place for certain categories of journeys and lengths of haul, for which the value of time savings becomes a decisive factor. In evolving an integrated transport system, we are primarily guided by the realisation that transport agencies are not competitive, but complement and supplement each other. The measurement of resource costs is one of the broad approximations in this direction. As between different transport services, it is to their being complementary rather than substitute that we wish to draw attention, especially in India, where each agency of transfort is inadequately developed and there is ample scope for all to advance within the overall resource constraints.

3.2 Comparative Cost Analysis :

Definition of Resource Cost

3.2.1. Resource cost of a product or service is the cost to the economy or society of actual resources utilised in its production. It is this notion of cost that is relevant for appraisal of alternative plans or projects at the national level. In the context of transport planning, resource cost would include cost to the operator, user and society.

3.2.2. Resource costs should be distinguished from financial costs, which include total expenditure actually incurred by an operator. In arriving at these costs, inputs are valued at market prices inclusive of taxes and elements arising from market imperfections. Financial costs do not make any allowance for externalities, such as pollution, noise, risk to public life and inconvenience to society in general.

3.2.3. By contrast, resource costs are estimated by adjusting financial expenses to the extent they do not reflect real economic costs. This calls for shadow pricing of various factor inputs. Taxes and duties are excluded because these usually represent transfer payments and do not reflect real costs to society. However, taxes imposed to reflect scarcity values of factor inputs or becase of external diseconomies (that is, those which are in the nature of shadow prices) have to be included. Similarly, subsidies received by public operators to cover losses are omitted. Adjustments are made in prices of factor inputs in general, due to market imperfections. For example, exchange rates may artificially inflate or deflate real costs. For interest on capital, the opportunity cost of capital, rather than the prevailing market or bank rate, is more relevant. The prevailing wage rates may also include subsidy in consequence of national policy, particularly when labour is unemployed. In general, it may be stated that a difference between financial and resource costs arises because of adjustments involved on the following accounts :

(i) transfer payments ;

(ii) market imperfections, including existence of administered prices ; and

(iii) external economies or diseconomies.

Components of Resource Costs

3.2.4. Resource costs consist of three com-

ponents, namely, those to operator, user and community.

(a) Cost to the Operator : Cost to the operator consists of expenses borne by, for instance, a road haulier, railway administration or shipping company, in operating a transport network. These include repairs, maintenance and operating costs of rolling stock or vehicles, as well as overhead, replacement and investment costs for generating additional capacity. Operator's cost data are usually available from financial records of transport undertakings, companies or rail administrations. For rail transport, cost of maintenance of way or track is borne by the operator, which is not so for roads because these are constructed and maintained by the Government. Similarly, for coastal shipping, loading and unloading facilities and other services are provided at ports and wharfs by the Government.

(b) Costs to the Users : There are also specific cost elements, borne exclusively by users, namely, passengers, traders or consignor-consignees. For passenger service, the main elements of user's cost are those incurred by passengers at terminals, which consist of cost of contveyance from and to place of work or residence to transport terminal, and porterage. Besides, there are costs of time spent in travelling and the degree of comfort or discomfort associated with it. For a comparative analysis of costs of different modes, it is essential to assess cost of these elements in monetary terms. In Western countries, an elaborate methodology has been evolved for calculating user's cost of travel time. In India, no study for estimating time value of passengers has been conducted so far. For freight transport, the cost of a number of elements, namely, packing, cartage, handling, transit losses, inventory cost and warehousing, are borne exlusively by users, which influence modal choice of the shippers.

(c) Social or Community Costs : The third component is social or community cost, which includes cost elements borne by society as a whole and not individually by any operator or user. These costs may be further classified into two groups —(i) infrastructural cost borne by the Government, such as cost of provision and maintenance of public roads, ports and wharfs ; and (ii) costs involved in externalities such as accident, pollution and congestion.

Time Horizon

3.2.5. Assuming an appropriate time horizon, for which costs are to be analysed, different cost concepts have been developed. These are briefly analysed below :

(a) Fixed and Variable Costs

The dichotomy between the two kinds of costs, fixed and variable, is derived from the notion of fixed and variable factors of production, the former being those which are more or less indispensable and the latter liable to change at short notice. But over a longer time horizon every factor could be regarded as more or less variable.

(b) Fully Distributed and Marginal Costs

Costs can also be average or fully distributed, or marginal or incremental. Under fixed factors marginal costs will decrease upto a point and then increase. Since fixed costs will get distributed over larger output, average fixed costs will decline continuously. Average costs too will decrease up to a point and then increase. The notion of average costs is useful in a situation where prices are fixed on a cost-plus basis. But investment decisions have to be based on long run marginal rather than average costs. In fact, even for operating a service, efficiency criterion requires incremental costs to be equal to incremental revenue. While marginal costs are, thus, relevant to decisions regarding both output level as well as pricing, average costs may, at best, help in determining the extent of mark-up on marginal costs, if the policy aim is to generate internal surpluses.

(c) Long run versus short run costs

As all factors can be varied and productive capacity increased over a period of time, a producer is able to exploit economies of scale and lower his costs in the long run. It follows that as the economy is continuously investing for capacity creation to meet growing demands decisions must necessarily be based on long run considerations.

3.2.6 To conclude, in planning we should be concerned with costs which are (i) incremental rather than fully distributed, (ii) long run rather than short run, and (iii) resource rather than financial.

Allocation of Joint or Common Costs :

3.2.7 A major problem in transport costing is existence of joint and common costs. Common costs are not traceable to a particular kind of output or service. For instance, passenger and freight services are usually operated over the same road or rail track and costs of maintenance of way are common to both of them. Common costs fall into two main categories, namely, joint and common costs. Under joint costs, one product is essentially produced in a fixed proportion to the other as a by-product, but in common costs this proportion can be varied at will. Empty return of vehicles or wagons is an item of joint costs, as it is an essential ingredient of loaded movement and is more or less, fixed for specific routes. As distribution of joint and common costs over output is a difficult costing problem, statistical analysis has been increasingly used in recent cost studies to derive a logical basis for it.

RITES Study on Resource Costs

3.2.8 The Planning Commission entrusted RITES with a study of resource costs of railways, road transport and coastal shipping on a comparable basis. Resource costs estimated by RITES, however include only operator and user costs, not social costs because of lack of conceptual clarity and difficulty in quantification. RITES has computed costs for 13 homogeneous or representative commodity groups and over 15 distance slabs for rail and road*. It also computed relative rail and road costs for passenger traffic. Coastal shipping costs have, however, been estimated only for coal and salt, the two commodities which dominate dry cargo between selected points of origin and destination. Costs of inland water transport for movement of bulk cargo have been calculated by the Transport Policy Planning Project.

3 2.9 The methodology used in computing resource costs is described in reports submitted by RITES on modal costs. Financial costs have been converted into resource costs, following the norms used by project appraisal division of the Planning Commission. The following adjustments were, however, made :

i) Taxes and duties were excluded;

ii) A premium of 25 per cent was applied to exchange rate for imported components;

iii) Economic costs of electric power was taken as Rs. 0.20 per kwh;

iv) Accounting rate of interest was taken at 12 per cent per annum. For calculation of depreciation, the same rate was applied by using sinking fund approach;

v) Wage rate was not shadow priced; and

vi) Capital cost was assessed at 1976--77 prices.

After these adjustments, RITES computed both short run and long run marginal resource costs,** which have been indicated for different distance slabs. For modal split analysis, only long run marginal costs have been examined

Rail and Road Costs—Freight Traffic :

3.2.10 Rail operators costs were estimated separately for broad and metre gauge and distinguished by type of track and traction. They were also computed separately for block load or full train load and wagon load movements. Traffic in smalls has been excluded as it forms an insignificant part of total traffic moved by rail. Cost calculations take into account the load factor and empty return ratio which vary for different commodities. User costs were computed from data collected for a sample of firms. Information was collected on a large number of items such as packaging, handling, local cartages, transit storage, inventory cost and transit losses.

3.2.11 Road costs were calculated, assuming a load factor of 100 per cent and empty return

* See annexure 3. 1.

** For calculating long run marginal costs, capital costs of projects at current prices have been used.

ratio ranging from zero to 30 per cent. Infrastructural costs, that is, provision and maintenance of roads, were based on a selected number of sections of national highways in plains as well as in hilly terrain.

Comparion of Rail and Road Costs :

4.2.12 A comparison is made of rail and road costs for freight traffic to assess the relative advantage, of these two modes. Cost data and corresponding break-even points for eleven commodity groups are shown graphically in charts 3.1 to 3.11. We also present cost data in annexure 3.2 for a selected number of commodities which are representative of rail and road traffic for selected distance slabs. Rail costs are analysed for broad gauge only. Metre gauge costs, although computed by RITES, are not analysed here. Operator and user costs are shown separately. Rail costs data are separately shown for diesel and electric traction and for block and wagon loads.

3.2.13 There is wide difference in costs between diesel and electric traction and block and wagon load movement. The difference in costs between block and wagon load movement is mainly due to economies of scale, in particular savings in marshalling and other terminal costs. The difference in costs between electric and diesel traction increases with length of haul, costs for electric traction decreasing as the distance increases. Cost reduction occurs primarily for operator costs, user costs being the same for two tractions. These cost reductions are summarised in table 3.2 for block load movement. Similar cost reductions also occur in respect of wagon load movements.

Table 3.2

Variation In Costs Between Diesel and Electric Traction

(Rs. per tonne)

Commodity	Amount by which Cost by Electric Traction (Double line) decrease vis-a-vis Diesel Traction (Double line) in distance slabs				
	50	300	650	950	1250
1	2	3	4	5	6
1. Wheat	1	6	13	19	25
2. Cotton (Raw)	1	7	15	22	29
3. Potatoes	1	7	15	23	30
4. Coal	1	7	15	21	28
5. Fertilizers (urea)	1	6	13	19	25
6. Sugar	1	6	13	19	25
7. Petroleum (HSD)	1	9	19	28	37
8. Tea	1	8	17	25	33
9. Cotton Textile	1	7	15	22	29
10. Cement	1	6	13	23	25
11. Livestock (Buffaloes)	2	14	30	44	57
12. Steel Tubes & Pipes	1	8	16	24	31
13. Small Machinery	1	7	15	23	30

3.2.14 Turning now to comparative resource cost advantage, table 3.3 shows cut-off points for elevencommodities between rail and road separately for diesel and electric traction, and for block and wagon load movement. The cut-off points for cotton textiles is not shown in the table as these fall outside the distance zone of 1250 kms used for break-even analysis. The lowest cut-off points are for block load movement on electric traction for virtually every commodity group. The cut-off points occur at shorter hauls for livestock (134), followed by fertilizers (155), cement (157), sugar (162), steel (166), coal (169), wheat (186), potatoes (211), machinery (251), cotton (328) and tea (701). Thus, roads tend to lose advantage over rail beyond cut-off points of around 200 kms for a large number of commodity groups which are analysed when freight movement takes place on electric traction. But for diesel traction, cut off points occur at longer hauls as may be seen in table 3.3. In table 3.4, breakeven points for various commodities are shown on the basis of a weighted average of costs for commodities within each group and for different traction.

Table 3.3

Break-Even Points (In KMS) For Road and Rail Movements**

(In kms)

Commodity	Diesel Single Line		Diesel Double Line		Electric Double Line		Average	
	Block Load	Wagon Load	Block Load	Wagon Load	Block Load	Wagon Load		
1	2	3	4	5	6	7	8	
Wheat	229	340	233	349	186	267	267	(247)
Cotton (raw)	494	1132	508	1164	328	609	706	
Potatoes	290	741	297	921	211	339	467	
Coal	215	346	220	358	169	252	260	(201)
Fertilizer	183	275	185	281	155	222	217	(200)
Sugar	195	319	197	327	162	247	241	
Tea	*	*	*	*	701	*	701	
Cement	188	285	190	291	157	224	222	
Livestock	161	338	162	343	134	262	233	
Steel Tubes & Pipes	215	671	221	723	166	309	384	(311)
Small Machinery	322	660	328	683	251	367	435	

NB : Figures in brackets are moderated by using the proportions in which the commodity moves in block (train) loads and wagon loads as weights.

* Beyond 1,250 kms.

** Mode falling below break-even points is road and above railways.

Table 3.4

Inter-Modal Comparison Based on Break-Even Points
Total Costs

Commodity Group	Lower cost mode before trade-off zone	Break-even points	Lower Cost mode after trade-off zone
1	2	3	4
Wheat	Road	247	Rail
Cotton (raw)	Road	706	Rail
Potatoes	Road	467	Rail
Coal	Road	201	Rail
Fertilizer	Road	200	Rail
Sugar	Road	241	Rail
Tea	Road	701	Rail
Cement	Road	222	Rail
Livestock	Road	233	Rail
Steel tubes & pipes	Road	311	Rail
Small machinery	Road	435	Rail

3.2.15 To sum up, most commodity movements are economical by road for shorter hauls up to 300 to 350 kms but beyond this range cost advantage lies with railways. The high value commodities like tea, cotton textiles and cotton (raw) are, however, an exception to this, where the comparative advantage lies with road even for longer haulage. For commodities like perishable fruits, vegetables and small machinery, roads have comparative advantage over rail up to 450 kms. For some commodities, such as fertilizer, coal, cement, livestock, sugar and steel tubes, comparative cost advantage for roads is up to 200 to 300 kms.

3.2.16 The cost analysis in the foregoing paragraphs is based on total resource costs, including operator and user costs. Table 3.5 presents break-even points separately for operator costs, the points moving in favour of railways if user costs are excluded. In column 4 of table 3.5 percentage reduction is shown in cut-off distances for various commodities as a result of exclusion of user costs. This reduction ranges from 33 per cent for livestock to 83 per cent for raw cotton. Road transport tends to have cost advantage over rail for longer hauls for certain commodity groups mainly because of relatively low user costs associated with this mode.

Table 3.5

Inter-Modal Comparison Based on Break-Even Points on Unit and Operator Cost

Commodity Group	Break-even points (in km) based on		Percentage of downward shift
	Total cost	Operator cost	$\frac{(2)-(3)}{2}$ X100
1	2	3	4
Wheat	247	89	64
Cotton (raw)	706	124	83
Potatoes	467	176	62
Coal	201	121	40
Fertilizer	200	86	57
Sugar	251	117	52
Tea	701	342	51
Cement	222	113	49
Livestock	233	156	33
Steel tubes & pipes	311	109	65
Small machinery	435	221	49

Sensitivity Analysis

3.2.7 RITES carried out sensitivity analysis to examine the effect on break-even points of increases in diesel prices and densities on rail sections. Diesel prices were raised by 50 per cent and 100 per cent over 1976-77 level, and densities from 55 per cent to 90 per cent. The results of sensitivity analysis are shown in tables 3.6 and 3.7 respectively.

Table 3.6

Shift in Break-Even Points With Increase in High Speed Diesel Oil Prices

Commodity Group	Average* break-even points (in kms)	Percentage downward shift under assumption**	
		I	II
1	2	3	4
Wheat	265	20	32
Cotton (raw)	825	37	56
Potatoes	563	42	53
Coal	218	19	31
Fertilizer	212	18	30
Sugar	260	20	33
Cement	238	19	31
Livestock	251	18	36
Steel tubes & pipes	362	38	49
Small machinery packages, drums etc.	490	31	43

* These break-even points related to diesel traction.

** Assumption 1 : 50 per cent increase in HSD price over 1966-77 level.

Assumption 2 : 100 per cent increase in HSD price over 1976-67 level.

Note : Tea is not included in the table as in the case of diesel traction, its break-even point lies beyond the maximum distance of 1,250 kms considered in the analysis.

The rise in fuel prices sharply reduces break-even points, particulary with 100 per cent increase in fuel costs over 1976-77 level, thus adversely affecting the position of road transport. OPEC oil prices have already increased by more than 100 per cent over the 1976-77 level. If the sensitivity analysis are carried out by raising oil prices over the present base, the break-even points will be more pronounced against road transport. Break-even points move considerably in favour of railways as utilisation of its network improves.

Table 3.7

Shift In Break-Even Points With an Increase in Density

Commodity Group	Earlier situation (55 per cent capacity utilisation)		New situation (90 per cent utilisation)	
	Block Load	Wagon Load	Block Load	Wagon Load
1	2	3	4	5
Coal	220	358	178(19)	269(25)
Fertllizers	185	281	161(13)	233(17)
Wheat	233	349	195(16)	282(19)
Small machinery	328	683	266(19)	392(43)
Steel tubes & pipes	221	723	176(20)	335(54)
Sugar	197	327	169(14)	262(20)
Cement	190	291	164(14)	237(19)
Tea	*	*	1024(NA)	nA
Potatoes	297	921	226(24)	367(60)
Cotton (raw)	508	1164	350(31)	664(43)
Livestock	162	343	138(14)	209(10)

Note : Figures in brackets refer to the percentage decline in break-even distance in new situation vis-a-vis the earlier situation.

* In this case break-even point lies beyond the range of their length of 1,250 kms considered for thestudy.

Passenger Traffic

3.2.18 Rail costs were estimated separately for two alternative situations, namely, travel between two mofussil towns, and a mofussil and metropolis. Calculations were made for broad and metre gauge separately. These were further distinguished for mail and express and passenger services by traction-Costs were computed for trip lengths up to 1,550 kms for mail and express and up to 500 kms for stopping passenger services. Further, for both mail and express and passenger trains, 100 per cent capacity utilisation was assumed but for passenger services calculations were also made at capacity utilisation of 75 per cent. User costs were computed from data collected for a sample of passengers. These costs include expenses incurred by travellers for reaching points at the origin and final destinations of their journeys, that is, ingress and egress costs. Value of time savings was not quantified because of lack of data on valuation of non-working time spent on travelling.

3.2.19 Road passenger costs were computed for bus operations in plains on a selected sample of undertakings. Distinction was also made for travelling between mofussil towns and between mofussil and metropolitan cities, corresponding to the rail situation. The cost calculation was based on 90 per cent of utilisation of bus capacity.

3.2.20 Rail and road cost data are presented in annexures 3.3 and 3.4 respectively. For every case we have studied, rail pessenger resource costs consistently are higher than those of highway tranport for a length of journey up to 500 kms. For example, even if we assume a most efficient rail situation, namely, electric double line, rail operator costs at Rs. 7.95 per passenger for a distance of 150 kms is about two times higher than that of road. In these calculations, RITES has not made any attempt to place values on time savings, comforts and convenience. If such valuations were made, cost advantage could be in favour of railways. In real life, valuations such as these have an important part in determining modal choice of travellers.

3.2.21. Data on resource costs for coastal shipping and IWT are presented elsewhere*. Looking at comparative economics, we find that neither of these modes has significance in determination of inter-modal mix. The future of coastal shipping lies mainly in catering to project-oriented traffic, particularly if traffic originates and terminates at ports only, without involving any transhipment. Traffic posential for coastal shipping has been indentified there. IWT also has cost advantage for traffic originating and terminating on water fronts, and its role in the totality of transport is limited.

3.3. Energy in Transport Sector

3.3 Energy has special significance in transport not only because it is one of the major users of energy but also because modes use different froms of energy and have varying intensities. The latter aspect is particularly important as it implies that planners have an option within certain limits to evolve appropriate modal mix to economise use of energy in transport sector, especially of petroleum products. This option can be exercised in two ways. First, by promoting modes which are relatively more energy efficient per se and, secondly by selecting a modal mix which is compatible with India's energy resource endowment. As a background to our attempt at forecasting demand for energy in transport sector, we intend to examine evidence on energy intensities of various modes. But before doing so, an overall view of energy situation in India with particular reference to energy consumption in transport is useful.

Overview of Energy Situation

3.3.2 Like many other developing countries, India, generates energy from a variety of sources, varying from electricity obtained from nuclear fuels to agricultural waste and animal dung. The most significant commercial energy sources are coal, oil and electricity. India consumes today about 100 m. tonnes of coal and 30 m. tonnes of petroleum products. To these figures must be added electricity generation of a little over 47 TWH (equivalent to some 30 million tonnes of coal). India is richly endowed in coal (82,900 m. tonnes) and at the present rate of consumption our coal reserves should last a few centuries. There is also much potential for hydro-electric generation. Out of an estimated hydro-electric potential of 3960 TWH

* See chapter 14 and 15.

(equivalent to power potential of about 100,00mw at 40 per cent factor) only 10 per cent of potential has been developed so far. While India is fairly well-off in coal reserves and hydro potential, the endowment in crude oil of 360 million tonnes is poor. Our current indigenous production of crude oil is around 10 m. tonnes just enough to meet about a third of our demand. The production capability in 1982-83 is expected to reach about 22 m. tonnes. The Working Group on Energy Policy has, however, assumed that a production of 24 m. tonnes could be achieved by 1987-88, provided adequate investment is made in oil exploration and that this level of production could be retained up to 2000 A.D.

3.3.3 Table 3.8 shows trends in sector-wise consumption of total commercial energy and table 3.9 similar trends in coal consumption. After industry, transport is the second largest user of commercial energy and accounts for about 32 per cent of commercial energy consumption. In 1978-79, coal consumption by transport, mainly railways, was only 10 per cent of the total as against 40 per cent before. In absolute terms, out of 100m. tonnes of coal produced in 1978-79, about 30 m. tonnes were used for power generation, about 24 m. tonnes for steel and about 13 m. tonnes for transport. Other sectors of the economy, including agriculture, industry other than steel, and domestic sector, consumed only 33m. tonnes of coal.

Table 3.8

Total Consumption of Commercial Energy : Sector-Wise

1953-54 to 1978-79

(In million tonnes of coal replacement)

Sector	1953-54	1960-61	1965-66	1970-71	1975-76	1978-79
1	2	3	4	5	6	7
Household	12.7	20.8	26.5	35.5	37.4	40.3
	(21.3)	(20.6)	(18.0)	(18.0)	(14.8)	(13.7)
Agriculture	1.8	3.6	6.3	9.1	18.1	31.3
	(3)	(3.6)	(4.3)	(4.6)	(7.2)	(10.6)
Industries	22.4	39.7	60.8	76.3	101.8	113.4
	(37.3)	(39.2)	(41.4)	(38.7)	(40.3)	(38.5)
Transport	21.5	34.2	49.7	64.6	85.5	93.2
	(35.8)	(33.8)	(33.1)	(32.7)	(33.8)	(31.7)
Others	1.7	2.9	3.7	11.8	9.9	16.1
	(2.8)	(2.8)	(2.5)	(6.0)	(3.9)	(5.5)
Total Commercial Energy Consumption	60.1	101.2	147.0	197.2	252.7	294.3

(Figures in brackets indicate percentage consumption in each sector)

Source : Report of Working Group of Energy Policy (1979)

Table 3.9

Sector-Wise Share of Coal Consumption

(Excluding coal for power generation)

1953-54 to 1978-79

(In percentage)

Sector	1953-54	1960-61	1965-66	1970-71	1975-76	1978-79 (provisional
1	2	3	4	5	6	7
Household	7.6	8.4	7.9	7.9	5.1	5.8
Agriculture	—	—	—	—	—	—
Industries	48.1	47.1	58.1	60.5	71.9	73.4
Transport	42.2	43.5	33.4	31.0	20.3	18.0
Others	2.1	2.0	0.6	0.6	2.7	2.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source : Report of Working Group on Energy Policy (1979)

3.3.4 With the progressive withdrawal of steam locomotives from service, coal consumption in transport is expected to decline gradually to around 3 m. tonnes or less than 1 per cent of total coal output by the turn of the century. The present railway policy is to keep steam locomotives in service till the end of their useful life. These locomotives, however, consume 13 m. tonnes of coal of high grade quality. If these steam locomotives were to be replaced, only 2 m. tonnes of low grade coal would be required to generate electricity or only 0.6 m. tonnes of oil to run a corresponding number of electric or diesel locomotives, thereby releasing 13 million tonnes of high grade coal for alternative use. However, as replacement of existing steam locomotives will require sizeable capital investment for acquisition of new stock, any revision of railway policy will entail a detailed cost-benefit study. The railways may examine feasibility of this idea in the interests of energy conservation.

Energy Intensity of Different Modes

3.3.5 Little systematic evidence is available on energy intensities of different modes of transport in India. Earlier work in this area to our knowledge are the studies on energy intensities of roads and inland waterways by H.C. Malhotra* and NCAER**. In view of paucity of data, we assigned a study on

* H. C. Malhotra Prospects of Inland Water Transport on the Ganga-Bhagirathi-Hoogly published in "Indian Shipping Navigation and Allied Industries" DRCCA, Calcutta, Vol. 13 No. 3

** National Council of Applied Economic Research NCAER : Traffic and Economic Survey of Ulhas River-Thane Creek-Bassein Creek Waterways, 1974.

this issue to Dr. K. K. Murty of National Institute of Training in Industrial Engineering (NITIE) at Bombay. Dr. Murty's study has provided us with up-to-date and systematic information on energy intensities of rail and road transport. He did not examine evidence for inland waterways or coastal shipping, for which we base our conclusions on studies carried out by Transport Policy Planning Project.

Conceptual Framework

3.3.6 Energy efficiency of different modes is measured in terms of their energy intensity or intensiveness, which measures energy needed to produce one unit of transport service. But this concept is beset with difficulties of aggregation. First, different modes use different kinds of energy, such as coal, oil and electricity and it is necessary to adopt a common unit of measurement. Two measures are often mentioned namely, (a) coal equivalent tonne which expresses heat content (in calories) of each fuel in terms of heat content of an average tonne of coal ; and (b) coal replacement tonne, which measures the amount of coal needed in the economy if no other source of energy were available. Coal equivalent tonne is the most commonly used aggregated measure in international studies but in India coal replacement tonne is commonly used. Secondly, vehicle propulsion energy is influenced by several operating conditions, such as grade, curvature, surface, age of vehicle, load factor, speed and so on. There will be thus a wide variation in calculated values of energy intake per vehicle-km for the same mode of transport. The term "energy intensity" usually measures the amount of energy needed to move one person or one tonne over one km by a given vehicle. When these measures are averaged for an entire system, they are described as "energy intensities" of mode. Energy intensities of a mode are thus an "average" concept, which conceals wide variations in energy intake, depending on differences in operating conditions. Thirdly, it is useful to distinguish between energy needed for propulsion of vehicle, that is, running vehicles, and for manufacturing vehicles, building rail tracks and roadways, and maintaining vehicles and permanent ways. When these non-propulsion energy requirements are spread over the life-time of facilities and allocated on a passenger km basis, the amount of energy used for propulsion is usually much larger than that used for non-propulsion purposes. Nevertheless, non-propulsion energy requirements have to be considered to draw conclusions about overall requirements of different modes. For instance, as inland water transport requires smaller investment in permanent ways and other fixed assets in comparison with other surface modes, it has a lower energy intensity, measured in overall terms, than in terms of energy needed for propulsion only.

Findings of NITIE Study

3.3. 7. The NITIE study has computed energy intensities separately for propulsion and line haul operations. The latter operations are further divided into maintenance, construction and vehicle manufacture. Table 3.10 summarises NITIE'S calculations on energy used by passenger vehicle for propulsion and non-propulsion purposes. Data are presented in BTU per vehicles km. and relate to passenger vehicles in rail and road transport. Table 3.11 presents data in terms of BTU per passenger km. In column 5 of this table propulsion energy is shown as a percentage of line-haul energy for modes of passenger travel. The assumptions used for calculating energy intensities, including vehicle occupancy, are given in table 3.11.

3.3. 8. A single occupant car has the highest energy consumption, as opposed to suburban train which has the lowest. The major factor accounting for differential energy efficiencies are obviously occupancy ratios assumed for vehicles. The data brings out a significant correlation between energy used for propulsion and line haul operations when energy intensities are measured in terms of BTU per passenger km. Thus, automobile has the highest energy intensity for both propulsion and non-propulsion operations, while suburban rail (electric) has the lowest for both these operations. The ratio of propulsion energy to line haul energy varies erratically for different modes without showing any causal relation, the ratio being the lowest (71 per cent) per automobile and suburban rail (electric) and the highest (99 per cent) for main line rail (steam).

Table 3.10

Line Haul Energy for Passenger Transportation Modes In BTU/Vehicle-km

(based on average values)

Mode	Propulsion	Mainte-nance	Construc-tion	Vehicle manufac-ture	Line-Haul
1	2	3	4	5	6
Main line rail (Diesel)	121,055	2,850	3,000	2,915	129,820
Main line rail (Electric)	41,595	2,850	3,000	2,915	50,360
Main line rail (Steam)	776,840	2,850	3,000	2,915	785,605
Suburban Rail (Electric)	21,935	2,850	3,000	2,915	30,700
Urban Bus (Diesel)	9,178	600	210	650	10,638
Regional Bus (Diesel)	8,410	600	210	650	9,870
Bus (Petrol)	15,135	600	210	650	16,595
Automobile (Petrol)	3,817	1,000	70	625	5,512
Scooter	625	140	25	75	865

Source : NITIE Study.

Table 3.11

Operating and Line Haul Energy In BTU Per Passenger-km

Mode	Occupancy	Opera ting energy intensity propulsion energy	Line Haul energy intensity	Column 3 as a percentage of column 4
1	2	3	4	5
Single occupancy automobile	1	3817	5512	69
Average automobile	2	1909	2756	69
Main-line rail (steam)	600[a]	1294	1309	99
Scooter	1	625	865	72
Bus (Petrol)	50	303	332	91
Urban Bus (Diesel)	50	184	213	86
Regional Bus (Diesel)	50	168	197	85
Main-line Rail (Diesel)	900[b]	135	144	94
Main-line Rail (Electric)	900[c]	46	56	82
Suburban Rail (Electric)	800[d]	27	38	71

a It is assumed that an average steam loco hauls 8 passenger coaches of 75 seats each.

b It is assumed that the average diesel loco hauls 1275-seater coaches.

c It is assumed that the average electric loco hauls 1275-seater coaches.

d It is assumed that the average suburban electric rake hauls 8 coach train each of 100 seats.

Source : NITIE Study.

Freight Transport

3.3. 9 The operating and line haul energy intensities of passenger modes have been estimated and compared in the preceeding paragraph. Using similar data for freight transport, NITIE study calculated operating energy intensities for different modes of transport. These are shown in table 3.12. As traffic density varies on railway netwoik from section to section, fuel efficiency of railways has been calculated for an assumed traffic density (20,000 to 30,000 net tonne km per day). There will be variations in fuel efficiencies if a different density class is used. For this reason NITIE has also calculated fuel efficiency of Indian Railways on the basis of average figures of net tonne-km and total fuel consumed for the three years 1974-75 to 1976-77. In table 3.13 where we present a summary comparision of energy efficiencies of different modes of passenger and freight transport, figures relating to railways are based on average fuel consumption for these three years. This table

also shows energy intensities for barge and pipeline operations. Whlle NITIE report mentions various assumptions used in calculating intensities of rail and road transport, no ıeference is made to assumptions in computing intensities of barge and pipeline transport.

Table 3.12

Propulsion Efficiency of Freight Transport In India

Mode	Capital cost[(a)] (paise/tonne-km)	Fuel Efficiency (BTU/tonne-km)
1	2	3
Steam Train[(b)]	5.90	2764.80
Diesel Train[(b)]	5.90	166.30
Electric Train[(b)]	6.55	105.76
Diesel Truck[(c)]	11.23	1587.30
Barge	5.60	328.00

(a) Total capital invested divided into a numer of tonne-km performed in a year.

(b) Density class 20,000 to 30,000 net-tonne-km per day per km of route.

(c) 7·5 tonne pay load, 40 km. average speed.

Source : NITIE Study

3.3.10 The broad conclusions which emerge from NITIE study are that for freight electric traction, railway is the most efficient form of transport in terms of energy consumption, followed in that order by railway driven by diesel traction, pipeline, inland water transport, diesel truck and railway on steam traction. Steam traction on railways is thus most inefficient from the viewpoint of energy economy, while electric traction is most efficient in energy terms for haulage of both passenger and freight traffic.

More Evidence on Energy Intensities

3.3.11. NITIE has not spelled out assumptions made for calculating energy intensities of inland water transport, nor has it given any information on energy efficiency of coastal shipping. Accordingly, studies on energy intensities of these two modes were undertaken by Transport Policy Planning Project. The results of these studies are shown in table 3·14. For comparison, energy intensities of inland water transport computed by Malhotra and NCAER are also displayed in the table.

3.3.12. Energy intensities of inland waterways have been calculated in the Planning Commission's study by assuming a load factor of 50 and 75 per cent, a speed of 12 km per hour for a flotilla of 500 tonne and 1,000 tonne capacity, and of 15 km per hour for a flotilla of 1,500 tonne capacity. It was also assumed that a flotilla of 500 tonne capacity will consume 40 litres of oil per hour, while a flotilla of 1,000 tonne and 1,500 tonne capacity will consume 50

litres and 60 litres of oil per hour respectively. For coastal shipping, energy intensities were calculated for actual fuel consumption on voyages performed by three selected vessels of average size of 14,400 DWT in 1976-77 or 1977-78.

Table 3.13

Comparison of Energy Efficiency of Transport Modes

Mode	Energy	
	Propulsion purposes	Non-propulsion purposes
	BTU/Pass.-km	BTU/Pass.-km
1	2	3
Passenger		
Electric traction	54.6	10.0
Diesel traction	151.2	9.0
Steam traction	1445.8	15.0
Diesel Bus	288.7	29.0
Petrol Bus	526.5	29.0
	BTU/Tonne-km	
Freight		
Electric traction	84.6	
Diesel traction	255.5	
Steam traction	3576.9	
Diesel truck	1587.3	
Barge	328·0	
Pipeline	281.7	

Source : NITIE Study

3.3.13. Barges of both 500 and 1,000 tonne capacity are less energy efficient than electric or diesel traction on railways. However, a barge of 1,500 tonne capacity is more energy efficient than diesel traction but is still less efficient than electric traction. Coastal shipping is also less energy efficient than electric traction but is more efficient than any other mode of transport, including diesel traction on railways.

3.3.14. In table 3.15 more evidence on energy intensities of passenger and freight modes of transport is presented for actual fuel consumption. It also confirms the evidence given in NITIE study that railways are most economical in energy terms than any other mode of transport for both passenger and freight transport.

Table 3.14

Energy Intensity of Inland Water Transport and Coastal Shipping

(BTU/Tonne-km)

Mode	Size of Vessels			
	500 Tonne	1000 Tonne	1500 Tonne	14400 DWT
Inland Water Transport Planning Commission (TPPP)				
(a) Load factor 50%	437	274	175	—
(b) Load factor 75%	292	182	117	—
Malhotra	328	—	—	—
NCAER	256	—	—	—
Coastal Shipping				
Coal	—	—	—	151
Salt	—	—	—	176
Total (Coal & Salt)	—	—	—	155

U. S. Experience :

3.3.15. Evidence available from the U. S. experience shows that energy efficiency of pipelines is highest, followed by waterways and railways among modes used for inter-city freight transport. The relevant data, gleaned from various studies, is shown in table 3.16.

Table 3.15

Energy Intensity of Different Modes

Passenger Traffic	Consumption per Available Seat km (in litres)
1	2
Air Transport[1]	
Air Bus	0.042
Boeing	0.055
Turbo Prop :	
F 27	0.075
HS 748	0.080
Road Transport[2]	
Car (4 seats)	0.025
Bus (52 seats)	0.0048
Rail Transport[3]	
A. C. (14)	0.016
First	0.0096 to 10.0058
2nd Sleeper	0.0031
Freight Traffic	Consumption per tonne km. (in litres)
Rail Transport[4]	0.0076
Road Transport	
Heavy Vehicles[5]	0.033—0.066
Light Vehicles[6]	0.104

1. Based on actuals of 1978-79 (Indian Airlines)
2. 10 kms. per litre for car and 4 kms per litre for bus.
3. On the basis of 5.24 litres/1000 GTKs consumed in 1977-78.
4. Based on average consumption for three years [1975-78).
5. [a] 10 tonnes load and 3.75 kms per litre and 80% load factor [inter-regional]
   [b] 6 tonnes load and 3.75 kms per litre and 66% load factor [intra-regional]
6. 1.5 tonnes load. 8 kms per litre and 80% load factor.

Table 3.16

Energy Efficiency For Inter—City Freight Transport Modes

(Compiled by Transportation Research Board, Washington—1977)

Mode	Ton miles/gallon	Source
1	2	3
Heavy Duty Truck	59	Rice[1]
(Combinations)	57	Mooz[2]
	49	Hirst[3]
	51	TSC[4]
	123-67	DOT/NASA[5]-Engineering estimate (optimistic)
Railway	203	Rice
	184	Mooz
	206	Hirst
	204	TSC
	418-251	DOT/NASA-Engineering estimate (optimistic)

1 R A Rice : System energy as a factor in considering future Transportation—[Dec. 70]
2 W E Mooz : Effect of Fuel Price Increase on Energy Intensiveness af Freight Transportation—[Dec. 71]
3 E Hirst : Energy Intensiveness of Passenger and Freight Modes—[April 73]
4 A Summary of Opportunities to Conserve Transportation Energy : Transport systems Centre—U. S. Dept. of Transport [August 1975]
5 Transport Vehicle Energy Intensities
U S Dept of Transport and National Aeronautics and Space Administration June, 1974.

1	2	3
Waterway	259	Rice
	280	Mooz
	206	Hirst
	275	TSC
Air Plane	3.4	Rice
	2.0	Mooz
	3.0	Hirst
	4.7	TSC
	16-18.5	DOT/NASA-Engineering estimate (optimistic)
Pipeline	302	Rice Oil pipeline
	73.5	Mooz Oil
	302	Hirst Oil (20" pie dia)
	206	TSC Oil
	52	TSC Gas pipeline

3.4 Employment Generation In Transport

Introduction

3.4.1. In the introductory section we have stated that it is not correct to mix up employment generation in transport with determination of optimal mix of transport modes. All the same, we feel it is useful to study employment potential in various modes, as this problem has not been examined systematically before. We set up a Working Group to study employment in transport and also commissioned two studies, one of which was entrusted to NCAER and the other to NATPAC.* NCAER was asked to study employment intensities in rail and road transport and NATPAC of Inland water transport. The Working Group has, however, examined employment potential in all major modes of transport.

Some Conceptual Problems

3.4.2. Total employment generated through investment in transport takes two forms, direct and indirect. Direct employment is created in both construction and operation phases of the transport system. Operation includes both maintenance and actual production of transport services. Indirect employment is induced by and hence causally related to direct employment through a chain of backward or forward linkages. The backward chain of linkages starts with material and service inputs used in construction or operation of the system. Each of these inputs has to be produced which causes additional manpower to be employed. Forward linkages in the transport system arise when additional employment is generated in consuming the transport service, such as employment created in loading and unloading, service stations and wayside amenities.

*National Traffic Planning and Automation Centre, Trivandrum.

3.4.3 Direct employment is created in such activities as provision of infra-structure, production of rolling stock, and running of service. For railways, for example, direct employment is generated in (i) construction and maintenance of permanent way and buildings ; (ii) manufacture and maintenance of rolling stock ; (iii) signalling and tele-communication ; (iv) commercial and other staff for operation; and (v) general administration. One can identify such activities in other modes as well, except that all activities may not be universally identifiable or common to different modes, as signalling and telecommunication will not figure in road transport as a direct activity.

3.4.4 While it is relatively straightforward to identify and enumerate direct employment, it is extremely difficult to follow all the chain reactions, stage by stage, for indirect employment. In fact, the effect of backward and forward linkages becomes weaker and still weaker as one moves away from industry, where direct employment is generated. Apart from these measurement problems, comparison between modes becomes extremely tricky as indirect employment is traced after a few stages of backward and forward linkages for each mode.

3.4.5 Another conceptual problem arises in calculating investment in transport to employment per rupee of investment for different modes. A well-established mode of transport with past investments will certainly have a higher employment co-efficient per unit of investment if historic costs (or book values) are taken into account as compared to a mode with more recent investment. Ideally one would like to measure capital at replacement cost (current prices) to make inter-modal comparison. A note of caution is, therefore, necessary in comparing inter-modal empolyment co-efficients per unit of investment.

Employment in Railways

3.4.6 The direct and indirect employment generated in railways per one lakh rupees of gross investment, as computed by the Working Group and further modified on the basis of NCAER data, is presented function-wise in table 3.17.

Table 3.17

Employment Intensity in the Railways—1977-78

Function activity	Employment (in lakh of persons)		Investment (in Rs. crores)	Employment Co-efficient per lakh rupees of Investment	
	Direct	Indirect		Direct	Indirect
1	2	3	4	5	6
1. Line Haul Operation	15.31	3.77[2]	3363.10	4.55	1.12
2. Track Construction and maintenance	5.12	—	2220.50	2.30	—
3. Production	0.37[1]	—	125.76	2.94	—
Total	20.80	3.77	5,709.36	3.64	0.66

1 It excludes employment provided by private workshops supplying stock and providing maintenace facilities to the railways.

2 It includes the RPF personnel employed by the railways on regular basis ; loading and unloading staff at terminals and transhipment points engaged by private parties ; porters ; catering staff and vendors.

Direct employment in railways is around 3.64 persons and indirect employment 0.66 person per lakh rupees of investment or 4.3 persons per lakh rupees of investment. As between railway operations, line haul has higher employment co-efficient per unit of investment, compared to track construction and maintenance and production of rolling stock.

Employment in Road Construction and Maintenance

3.4.7 Employment intensity per unit of investment in road construction and maintenance as calculated in various studies is presented in table 3.18.

Table 3.18

Estimates Of Employment Intensity In Road Construction And Maintenance

	Employment Co-efficient per lakh rupees Investment
1. Working Group on Roads for Five Year Plan (1978-83)	7.92
2. National Council of Applied Economic Research (NCAER)	
(i) 1974	52.0
(ii) 1979	15.7
3. Directorate of Transport Research (DTR) : 1976-77	27.0
4. Working Group	27.72

Notes on table 3.18.

1. *NCAER, Employment in Road Aransport and Road Construction, 1974. (NCAER has confirmed that their 1974 employment figure suffers from computational error).*

2. *NCAER, Employment Potential of Rail and Road Transport, June, 1979.*

3. Note on Methodology :

(i) The Working Group on roads for five Year Plan 1978-83 has based its estimate on the labour employed in construction or development activity. It dose not include empoyment generated in maintence of road nor cover indirect employment in construction activity to the extent desired. The Working Group has adopted investment employment norm form NCAER study 1974.

(ii) NCAER study 1979 is primarily based on employment norms of Punjab PWD for construction and maintenance per km of double lane national highway standard roads. This study covers both the construction and maintenance activities and provides its assessment on direct and indirect employment. The ratio of direct and indirect employment assumed by NCAER is 1:0.8.

(iii) The Directorate of Transport Research (DTR) derived employment co-efficient from studies of four different national highway projects each of which has a different co-efficient as follows :

Employment co-efficient per lakh rupees investment

(a) New construction	*31*
(b) Missing Links	*28*
(c) Strengthening of double lane carriage-way	*35*
(d) Widening and strengthening	*15*
Overall average	*27*

The employment generated in execution of construction activity alone has been evaluated against the cost of each project (without land acquisition cost) at the prevailing wage rate of labour in respective areas. In calculating man-years, DTR has assumed 250 working days a year as against 273 days accepted by NCAER and the Working Group on Employment. Later, the employment intensity and project cost of each

project has been clubbed to arrive at the employment co-efficient of 27 persons per lakh rupees investment. Making an allowance for land acquisition cost (at 10 per cent of the total project cost), the average employment intensity is estimated at 24.3 man-years per lakh rupees investment.

(iv) The Working Group on Employment has assessed direct employment intensity in both construction and maintenance activity by taking 40 per cent and 60 per cent of the 1977-78 investment on road construction and maintenance respectively as wage component and an average wage rate of Rs. 6.00 per day per person.

There are wide variations in co-efficients from one study to another. These are mainly due to differences in methodology, scope and coverage of each study. Some important differences in methodology are explained in footnote 3 appended to table 3.18 on page 49. In view of wide variations in these co-efficients, we place as a broad order of magnitude direct aud indirect employment in road construction at 27.2 persons and in road maintenance 0.3 person per lakh rupees of investment. (These figures compare with data given in NCAER study, 1979). This co-efficient of 27.5 for total employment in road construction and maintennance can be furthei divided into 15.0 persons in direct employment and 12.5 persons in indirect employment.

Road Transport

3.4.8 Road transport consists of two distinct categories—(a) mechanised, and (b) non-mechanised. Among mechanised means of transport, employment intensity has been assessed separately for buses, trucks, autorickshaws, tempos and taxis which practically cover almost all forms of commercial road transport in the country. Personalised means of transport, covering cars, jeeps, motor cycles, scooters and mopeds, have been excluded for purposes of this study. Estimates of employ ment co-efficients for non-mechanised road transport are limited to bullock-carts.

Mechanised Transport

3.4.9 We first examine employment norms assumed in various studies for mechanised road transport. These norms by type of vehicle and nature of operation are presented in table 3.19.

Table 3.19

Employment Norms in Road Transport

Type of Vehicle	Source				Number of persons per vehicle
	NCAER (1979)		DTR	Working Group	
	Public sector under takings	Private sector under-takings	(Public Under-takings)	Public sector	Private sector
1	2	3	4	5	6
Bus	7.39	6.85	7.40	8.82	7.66
Truck	NA	9.42	NA	NA	NA
Taxi	—	1.40	—	—	NA
Auto-rickshaw	—	1.45	—	—	NA
Tempos	—	3.88	—	—	NA

Employment norms assumed by NCAER and DTR per bus for public sector transport undertakings are identical. However while NCAER figure includes both direct and indirect employment, DTR study covers only direct employment. Further more, DTR does not take into account employment generated in distribution of spare parts, retreading and vulcanising activities which account for roughly 0.15 person per bus. NCAER study covers only a high density route of the Punjab roadways, while DTR study deals with a large number of State transport undertakings from different parts of the country. Compared with NCAER and DTR, the Working Group has assumed a higher norm for both public and private sector bus undertakings, as may be seen from the table.

3.4.10 We turu now to employment co-efficients in motorised transport. Using employment and investment norms for buses, given by Working Group and NCAER norms for other vehicles, employment co-efficient per unit of investment for different types of vehicles have been calculated. These are given in table 3.20.

Table 3.20

Employment Co-Efficient in Motorised Transport (1977-78)

Type of Vehicles	Number of Vehicles	Gross capital investment (in lakh rupees)	Employment (in lakh persons)		Employment Co-efficient*		
			Direct	Indirect	Direct	Indirect	Total
1	2	3	4	5	6	7	8
Buses	117,449	99,212	7.69	1.59	7.75	1.51	9.26
Trucks	368,193	195,427	21.80	11.34	11.15	5.80	16.95
Three Wheelers (auto-riskshaw & tempos)	113,870	12,597	1.69	0.47	13.42	3.73	17.15
Taxis	76,110	30,462	0.84	0.29	2.76	0.95	3.71
Total	675,622	345,178	32.02	13.60	9.45	4.00	13,45

The average employment intensity for commercial segment of motorised transport is 13.45 persons per lakh rupee of gross investment, of which 9.45 persons are accounted for by direct and 4.00 persons by indirect employment. Three wheelers have highest employment intensity (17.15 persons) followed by trucks (16.95 persons). Employment intensity in bus transport is 9.26 persons. Taxis have the lowest employment intensity of 3.71 persons per lakh rupee of investment.

Employment In Vehicle Production

3.4.11 In addition to transport operations, employment is also generated in production of vehicles. This employment can be further split into (i) manufacturing of chassis (and spares) and accessories; and (ii) body building of buses and trucks. The Working Group has estimated total employment in vehicle manufacturing and automative ancillary at 91,250 man-years which gives employment intensity of 2.21 persons per vehicle.

* Persons per lakh rupee of gross investment.

Taking total investment of Rs. 514 crores in the automobile industry (as given by Working Group), employment co-efficient comes to 1.73 persons per lakh rupees of investment. For body building NCAER and Working Group assume different norms for man-days needed for making bus/truck body. These norms are shown below :

Number of man-days required per vehicle

	Bus	Truck
NCAER	156	43
Working Group	200	56

The Working Group's estimates of employment generated by body building units on the basic of their assumed norms for the number of buses and trucks produced in 1977-78 are presented in table 3.21.

Table 3.21

Estimated Employment Generated in Body Building of Buses and Trucks, 1977-78

Type of Vehicles	Number produced	Employment per Vehicle (man-years)	Total employment (man-years)
Buses	11,375	0.75	8304
Trucks	29,868	0.20	5974
Total	41,243	—	14,278

Employment in Bullock-Cart Transport

3.4.12 Hardly any published information is available on employment or investment in bullock-cart transport. Based on the quinquennial livestock census, the Working Group has estimated bullock cart fleet at 13.5 million for 1977. Of this about 80 per cent is estimated to be operating in rural areas and the remaining 20 per cent in urban centres. Total investment in bullock carts (including part value of animals on the basis of two bullocks per cart) is further assessed at Rs. 3,000 crores. The Working Group calculated direct employment in bullock cart transport (both operation and maintenance, including animal upkeep) at 7.63 m. per year. Of this urban sector is assumed to account for 2.10 m. and rural sector 5.53 m. per year. In addition, employment in production of bullock carts is estimated at 5 lakh persons. Total employment in this form of transport thus comes to 8.13 m., which gives an employment co-efficient of 27 persons per lakh rupee of investment.

Employment in Coastal Shipping

3.4.13 The Working Group has also assessed employment intensity in coastal ships and sailing vessels. Direct employment attributable to coastal ships is given in table 3.22.

Table 3.22

Direct Employment Generated by Coastal Ships, 1977-78

Agency	Total Employment in Shipping and Allied services	Total Employment Attributed to Coastal Shipping
1	2	3
A. Govt. Agencies (Ministry of Shipping & Transport and Offices under the Ministry).		
(i) Transport Unit	768*	61*

* Out of the total employment of 768 in transport unit, 610 are involved in shipping/ports and related activities. Of this, 10 per cent is taken as the share of coastal shipping.

1	2	3
(ii) Director General of Shipping & Allied Offices	1348	134
(iii) Directorate of Light House and High Ships	1114	111
Sub-Total	3230	306
B. Private Agencies, Shipping Companies	25,650	2,213
Port Staff (Major Ports)	101,826	19,800
Dock Labour (Registered Major Ports)	31,485	6,100
Minor Ports	4,679	1,700
Dredging Corporation of India	590	590
Sub-Total	164,230	30,403
C. Production Unit (Shipyard)	37,072	37,403
Grand-Total	204,532	58,112

Employment attributed to coastal ships is assessed on the following lines.

(i) Employment in coastal shipping generated by Government agencies is based on the share of Indian shipping (g.r.t.) engaged in coastal trade vis-a-vis total shipping (g.r.t.) under Indian flag;

(ii) Employment in shipping agencies attributed to coastal shipping is based on employment (g.r.t.) ratio of shipping companies analysed by Directorate of Transport Research; and,

(iii) Port and dock labour estimates are based on percentage of coastal traffic to total traffic handled at major and minor ports.

The Working Group has calculated total investment in coastal shipping at Rs. 28,192 lakhs. Of this Rs. 17,000 lakh is investment on ports (attributed share to coastal shipping) and 11,184 lakhs on shipyards. This gives direct employment co-efficient of 2.4 persons per lakh rupees of investment. Indirect employment, which includes freight forwarders, customs staff, underwriters, insurance agents, staff in weighing establishments, packing industry and security staff, has not been evaluated due to lack of relevant data.

Sailing Vessels

3.4.14 There are 9,600 sailing vessels registered with the Director General (Shipping). According to estimates of the Working Group on Shipping, set up for the Sixth Five Year Plan (1978-83), sailing vessels provide direct employment to 100,000 persons. Of this, 80,000 are estimated as crew members and 20,000 are engaged in actual construction, repair and other ancillary works. Since one-third of sailing vessels are engaged in coastal trade, employment attributable to coastal trade operations, maintenance and construction together comes to about 33,000. Based on estimates of investment in sailing vessels, the Working Group has calculated employment co-efficient of 20 persons per lakh rupees of investment.

Employment in Inland Water Transport

3.4.15 Employment intensity for inland water transport was estimated at our instance by NATPAC. Employment co-efficients worked out by NATPAC are shown in table 3.23 separately for passenger and freight services.

Table 3.23

Estimated Employment Intensity in Inland Water Transport

Activity	No. of persons per lakh rupees of investment
1. **Passenger Transport Operations**	
a) Public Sector Undertaking (Mechanised Operations)	9.2
b) **Private Sector Operations**	
(i) Mechanised	2.9
(ii) Country crafts	58.8
2. **Freight Transport Operations :**	
(i) Mechanised	1.4
(ii) Non-Mechanised	20.8
3. **Boat Building**	
(i) Mechanised	14.8
(il) Non-Mechanised	N.A
4. **Indirect Employment*** (Forwarding and clearing services)	160
Overall average	33.59

Due to small capital investment, employment intensity for country craft used for passenger transport is much larger than for mechanised vessels. Employment generation by country craft is essentially for unskilled workers at comparatively low wage rates. Most of them are self-employed workers operating their own boats. Employment generated by public sector passenger services is higher than by private sector (mechanised) operators. In freight transport also non-mechanised vessels have a higher employment co-efficient than mechanised vessels due to low capital investment. The overall empolyment co-efficient for inland waterways is 34 person-years per lakh rupees of investment, which compares favourably with other modes of transport. In addition, inland waterways generate employment in construction and maintenance of navigational channel and terminal facilities. On the basis of data for Champakara Canal, NATPAC has estimated employment co-efficient at 13.2 persons per lakh of investment for these supporting operations.

* It includes freight handling and forwarding and clearing service. The results are based on a small sample of 2 firms operating in the Cochin region.

Employment in Air Transport

3.4.16 Employment generated in air transport as estimated by the Working Group is shown in table 3.24.

Table 3.24

Employment Intensity in Air Transport : 1977-83

Activity	Total employment	Employment attributed to Civil Aviation	Gross Capital investment (in lakh Rs).	Employment Co-efficient (per lakh Rs. of investment)
1	2	3	4	5
A. **Agency/Activity**				
(i) Main Ministry	501	235	—	
(ii) Director General Civil Aviation	9760	9760	9720*	1.32
(iii) CPWD (Aviation) staff & casual workers in Civil Aviation works	1941	1941		
(iv) D.G. Tourism	555	140		
(v) Meterological Deptt	7894	790		
(vi) Air India	12,676	12,676	23,274	0.54
Indian Airlines	15,117	15,117	22,780	0.67
(vii) International Airport Authority of India.	3,721	3,721	6,175	0.60
Sub-total		44,380	61,949	0.72
A. **Indirect Employment**				
Airport Facility Staff		10,444		
Flying Club		790		
Travel Agents &** Tour Operators		4,000		
Sub-Total		15,234		0.25

* Total expenditure of Civil Aviation Dept. on capital outlays since First Five Year Plan to 1977-78.

** It is based on information collected from certain private travel agents in Delhi.

Direct employment co-efficient in air transport is estlmated at 0.72 persons and indirect employment 0.25 persons per lakh rupees investment. Government departments concerned with civil aviation generate 1.32 persons employment per lakh rupees investment.

An Overview

3.4.17 An overview of comparative employment invensity per unit of investment in different modes of transport is presented in table 3.25.

Table 3.25

Comparative Employment Intensity In Different Modes of Transport—1977-78

Mode	Employment (number of Persons-Year) per lakh rupees of investment		
	Direct	Indirect	Total
1	2	3	4
1. Inland Water Transport			
1.1 Operations			33.59
1.2 Development of Navigatonal Channel	13.20		13.20
2. Road Construction and Maintenance	15.0	12.50	27.50
3. Road Transport Operation			
3.1 Bullock Carts	27.0		27.0
3.2 Three Wheelers	13.42	3.73	17.15
3.3 Trucks	11.15	5.80	16.95
3.4 Buses	7.75	1.51	9.26
3.5 Taxis	2.76	0.95	3.71
3.6 Vehicle Production (Chassis)	1.78		1.78
4. Coastal Shipping			
4.1 Sailing Vessels	20.0		20.0
4.2 Other Coastal Shipping	2.40		2.40
5. Railways	3.64	0.66	4.30
6. Air Transport	0.72	0,25	0.97

Inland waterways has the highest employment co-efficient per unit of investment compared to any other mode of transport. The next in ranking is bullock cart. Both these modes of transport with high employment co-efficient require low capital investment but they are, at the same time, slow-moving and useful only for specific transport purposes. Their role in national transport system is, however, limited. Among principal modes of transport, road transport operations generate more employment per unit of investment than railways. Air transport naturally has the lowest employment intensity. These findings have thrown up no surprises. We reiterate our view that employment generation, however, important it may be as a policy objective, has no part to play in determining an optimal inter-modal mix. The more important considerations are the type of service reqired and the resource cost at which it is provided, including energy cost.

3.5 Forecast of Traffic Demand Methodology :

3.5.1 Forecast of traffic demand is an important element in the exercise on determination of optimal inter-modal mix and investment plan for the transport sector. Here we deal with traffic forecast and its allocation between modes. Estimates have been worked out for a time horizon extending till the turn of the century.

3.5.2 A note of caution is necessary at the outset about reliability of traffic forecasts. As transport demand depends on macro-economic variables, such as industrial and mineral development, growth of population and location of economic activities, the accuracy with which traffic forecasts is made depends upon the nature of forecasts of future trends in these variables. Clearly, the longer the time horizon the more difficult it is to predict developments in macro-economic variables affecting transport demand. The forecasts we present should, therefore, be taken as broad prognostications of magnitude based on specified assumptions and trends.

3.5.3 We have estimated future freighi traffic on the basis of following four methods :

(1) Time trend analysis,

(2) Regression analysis,

(3) Transport co-efficient method, and

(4) Gravity model.

These methods are widely described in transport literature. In the trend method, data are plotted against time and type of curve noted. The curve is fitted using least squares technique. In regression method traffic demand is related to a set of predetermined variables, those most commonly included being growth of income, population, industrial, mineral or agricultural production and changes in industrial locations. Both transport co-efficient and gravity-model forecasting techniques are end-use methods in the sense that the demand for transport is obtained directly from requirements of user sectors. Accordingly, both methods depend on production targets of other sectors. In the present context, these production targets are calculated on the basis of projected rate of economic growth in the Sixth Plan (1978-83) and solution of Perspective Planning Division's input-output model. The difference between the transport co-efficient and gravity model is that while in the former method production targets are first translated into originating traffic by using transport (mainly rail) co-efficient and then into tonne-kilometres by multiplying by the average lead for each commodity observed in the past, in the latter method both originating traffic and its corresponding lead for each commodity are determined endogenously as solution of the gravity model. In other words, the gravity model determines commodity traffic pattern directly by relating the flow pattern to supply of commodity at the originating region, the demand for it at destination region and cost of transport*.

Result of Forecast : Freight Traffic :

3.5.4 Estimates of freight traffic based on different mentods are given in table 3.26.

* For a detailed discussion of methodology on traffic forecasting see working papers of Transport Policy Planning Project.

Table 3.26

Estimates of Freight Traffic by Alternative Methods

(In billion tonne-kms)

Year	Trend Analysis	Regression Analysis Variant I	Variant II	Variant III	Transport Co-efficient method	Gravity Model
1	2	3	4	5	6	7
1977-78 (Actual)	240	240	240	240	240	240
1982-83	287	286	322	308	300	273
1987-88	340	346	420	388	380	347
1992-93	402	418	440	478	480	468
2000-01	528	567	776	650	640	685

The trend line in the table was drawn on the basis of freight traffic data for rail and road in 1960-61—1976-77. The time series data on freight and passenger traffic and independent variables used in the regression analysis are given in annexure 3.5. The regression equation and zero-order matrix are given in annexure 3.6. Traffic forecasts were made on the basis of three assumptions on growth of industry and mineral sector as follows :

Variant I : The average growth of industrial and mineral sectors was assumed as observed in 1960-61-1976-77 (that is 4.5 per cent).

Variant II : Rates of growth based on the draft Plan Document—1978-83, these being 6.7 per cent for 1977-83, 6.4 per cent for 1983-88, 6 per cent for 1988-94 and 5.75 per cent for 1994-2001 A.D.

Variant III : Rates of growth of mineral and industrial sectors assumed to fall in between variants I and II, namely, 6 percent for 1977-83, 5.5 per cent for 1983-88, 5 per cent for 1988-94 and 4.5 per cent for 1994-2001 A.D.

We present data on sector-wise production targets used for estimating traffic by transport gravity-model methods in annexure 3.7. In the gravity model the break-down of final demand by regions for each commodity is obtained by using weighted index of per capita income and population. Regional output levels are determined by the "share and shift" method, which takes into account base year regional shares as well as expected shifts in location of industries. After obtaining regional output and demand levels for each commodity, gravity equation is used to assess inter-regional flows. The parameters of the model have been derived by using the base year flow and cost-matrices for rail and road collected by RITES. The basic advantage of this model is that, unlike other methods, originating traffic and average lead are both determined endogenously within the model. The model also generates traffic forecast by distance slabs, which is essential for determination of inter-modal mix. Table 3.27 presents traffic forecast by distance slabs obtained by the gravity model. In annexure 3.8 we present commodity-wise estimates for traffic forecast in this model.

Table 3.27

Traffic Forecast by Distance Slabs Based on Gravity Model

Distance slabs (kms)	Originating Traffic (millon Tonnes) 1982-83	1987-88	1992-93	2000-2001
1	2	3	4	5
1-100	29.30	33.79	48.26	69.76
101-200	33.90	40.90	61.31	85.03
201-300	30.79	28.95	36.11	54.43
301-400	24.28	35.31	48.03	67.14
401-500	21.78	24.79	33.31	48.13
501-600	20.94	31.21	33.38	50.18
601-700	23.17	15.75	22.28	33.42
701-800	11.70	28.42	33.35	45.99
801-900	17.57	11.57	19.70	27.85
901-1000	12.50	22.06	20.82	33.65
1001-1100	10.16	8.18	20.29	27.23
1101-1200	14.52	16.66	12.55	22.86
1201-1300	4.28	12.81	22.72	30.76
1301-1400	7.95	6.74	8.67	9.15
1401-1500	7.32	8.07	7.40	13.82
1501-1600	3.65	5.44	12.00	15.08
1601-1700	2.03	4.55	6.60	8.18
1701-1800	4.11	4.65	4.13	5.67
1801-1900	2.93	3.08	6.73	10.89
Above 1900	6.24	10.45	15.68	21.03
Total of above	296.83	362.54	485.21	698.43
Other	103.32	126.52	169.33	243.73
Grand Total	400.15	489.06	654.54	942.16

3.5.5 The trend method and variant I of regression analysis provide more or less the same traffic forecasts. These are the lowest estimates, as they reflect past growth trends in macro-economic variables. Estimates produced by the gravity model are lower than for 1982-83 ; but are close to estimates based on trend analysis and variant I of regression model for 1987-88. Thereafter, they get closer to estimates given by variant III of regression model. The highest estimates produced are by variant II of regression model. As there has been a shortfall between plan targets and actual achievements, traffic forecasts based on variant II, in our view, may not materialize. For determining inter-modal mix of traffic and projecting likely demand for energy in the transport sector, we have used traffic estimates based on variant III. These estimates are very close to estimates produced by gravity and transport co-efficient methods.

Passenger Traffic

3.5. 6 Estimates of passenger traffic relating to rail, road, and air transport have been made through time trend analysis. For rail and road, estimates have also been worked out by regressing passenger traffic on population. The fitted equation is shown in annexure 3.6.

Rail Passenger Traffic

3.5.7 Rail passenger demand has been estimated separately for suburban and non-suburban traffic. These forecasts are given in tables 3.28 and 3.29 respectively.

Table 3.28

Intra-city (Suburban) Rail Passenger Traffic

(In b. Pkms)

Year	Estimates on trend analysis	Estimate based on regression
1	2	3
1977-78 (Actual)	39	39
1982-83	50	49
1987-88	70	65
1992-93	97	85
2000-01	162	126

Table 3.29

Inter-city (Non-Suburban) Rail Passenger Traffic

(In b. Pkms)

Year	Estimates on trend analysis	Estimates based on regression
1	2	3
1977-78 (Actual)	137	137
1982-83	160	146
1987-88	198	171
1992-93	249	200
2000-01	358	251

Time trend forecasts are higher than regression in both cases. The share of non-suburban traffic which was about 78 per cent of total rail passenger traffic in 1977-78, is expected to decline to about 66 to 69 per cent by the turn of the century.

Road Passenger Traffic

3.5.8 Estimates for road passenger traffic based on trend as well as regression analysis are given in table 3.30.

Table 3.30

Road Passenger Traffic (in b Pkms)

Year	Estimated on trend analysis	Estimate based on regression
1	2	3
1977-78 (Actual)	250	250
1982-83	317	307
1987-88	379	358
1992-93	442	404
2000-01	542	474

3.5.9 We have made another estimate of road passenger traffic based on 6 per cent growth rate up to 1982-83 and 5 per cent thereafter. Road passenger traffic estimated on this basis and its results are given in table 3.31 below :

Table 3.31

Road Passenger Traffic (In b Pkms)

Year	Estimate
1	2
1977-78	250
1982-83	330
1987-88	425
1992-93	540
2000-01	800

Air Passenger Transport

3.5.10 The past time trend indicates a growth rate of about 10 per cent in air passenger traffic. With the increase in base, its growth rate is likely to fall. We have, therefore, adopted trend growth rate of 10 per cent per annum up to 1982-83 and 8 per cent thereafter. On this basis estimates of air passenger traffic by the turn of the century is likely to be 24 billion passenger kilometres. These estimates are presented in table 3.32.

Table 3.32

Estimates of Air Passenger Traffic

(In b Pkms)

Year	Trend Analysis	On the basis of 10 per cent rate of growth upto 1982-83 and 8 percent thereafter
1	2	3
1977-78 (Actual)	3.39	3.39
1982-83	5.60	5.90
1987-88	9.23	8.60
1992-93	15.38	12.70
2000-01	34.20	23.60

Estimates of passenger traffic for the three modes are summarised in table 3.33.

Table 3.33

Estimates of Total Passenger Traffic (In b Pkms)

Year	Railway			Road	Air	Total
	Intra-city	Inter-city	Total			
1	2	3	4	5	6	7
1977-78	39	137	176	250	3.4	429.4
1982-83	50	160	210	330	5.9	545.9
1987-88	70	198	268	425	8.6	701.6
1992-93	97	249	346	540	12.7	898.7
2000-01	162	358	520	800	23.6	1343.6

3.5.11 The total passenger traffic for the three modes increases from the base-figure of 430 b. to about 1344 b. passenger kms by the turn of the century. The shares of the two main modes remain more or less unchanged at 60 per cent for road and 39 per cent for rail, but for air transport, the share increases from less than 1 per cent to more than 1 per cent over the next two decades.

Inter-modal allocation of Freight Traffic

3.5.12 The projections of total freight traffic have been presented in table 3.26. In this section we allocate this traffic between rail and road under the following four assumptions :

Assumption I : Traffic is allocated between rail and road on the basis of a ratio of 67 : 33 as observed during the past decade.

Assumption II : Traffic is allocated on the basis of break-even points* calculated by RITES according to resource cost estimates for the base year 1976-77.

Assumption III : Traffic is allocated on the basis of break-even points* estimated by increased oil prices to 1978-79 level.

Assumption IV : Traffic is allocated on the basis of break-even points* by assuming 50 per cent increase in oil prices over 1978-79 level.

Allocation of traffic under assumptions II to IV has been made only for inter-regional traffic. Intra-regional traffic carried by roads which has been estimated at 48 b. tonne-kilometres for 1978-79, accounting for about 20 per cent of total traffic by rail and road, continues to be allocated to roads under assumptions II to IV above.

3.5.13 The traffic which shifts to rail on the break-even analysis under assumptions II to IV is not entirely allocated to rail on the assumption that there may be no rail connections to move traffic to all destinations. For this reason, we have allocated only 75 per cent and 50 per cent of traffic which shifts to railways on this analysis, the balance moving by roads. The inter-modal allocations based on these alternative assumptions are given in table 3.34.

* See axnexure 3.9

Table 3.34

Inter Modal Allocation of Freight Traffic by Rail and Road

(in b. tkms)

Year	Estimated total traffiic	Assumption I (as observed in the last 10 years)		Assumption II (1976-77 Diesel prices)				Assumption III (1979 Diesel Prices)				Assumption IV (50% increase over 1979 Diesel Prices)			
				(a)		(b)		(a)		(b)		(a)		(b)	
		Rail	Road	Rail	Road	Rail	Road	Rail	Road	Rail	Road	Rail	Road	Rail	Road
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Percentage share	100	67	33	70	30	72	28	72	28	74	26	72	28	75	25
1982-83	308	206	102	216	92	222	86	222	86	228	80	222	86	231	77
1987-88	388	260	128	272	116	279	109	279	109	287	101	279	109	291	97
1992-93	478	320	158	335	143	344	134	344	134	354	124	344	134	358	120
2000-01	650	435	215	455	195	468	182	468	182	481	169	468	182	487	163

(a) With 50 per cent of the inter-regional traffic moving by road beyond break-even level allocated to railways.

(b) With 75 per cent of the inter-regional traffic moving by road beyond break-even level allocated to railways.

3.5.14 When break-even analysis based on resource cost is used for determining modal shares, the share of road declines from 33 per cent under assumption 1 to 30 per cent under assumption II, 28 per cent under assumptions III and IV. These ratios have been worked out on the assumption resource cost is used for determining modal shares, the share of road declines from 33 per cent under assumption 1 to 30 per cent under assumption II, 28 per cent under assumptions III and IV. These ratios have been worked out on the assumption

3.5.15 Of the various assumptions used for inter-modal allocation, assumption III (a) which takes 1979 prices of diesel and assumes a 50 per cent shift of inter-regional traffic moving by road beyond break-even points to rail has been adopted. The calculations of energy demand and policy measures suggested by us are thus based on a modal split of 72 : 28 for rail and road.

3.6 Implications for Energy

3.6.1 Given the traffic forecasts of 650 b tonne kms for the year 2000 A.D. and the modal allocation under assumptions I, III (a) and IV (b), energy requirements have been worked out using energy co-efficients as given in table 3.15. The estimates are presented in tables 3.35 and 3.36. In table 3.35 we show energy requirements for freight and passenger traffic separately and in table 3.36 we compare in summary form our demand estimates with those of the Working Group on Energy Policy.

3.6.2 The highest demand for diesel oil results under assumption I, that is, when rail-road share is projected in the ratio of 67 : 33. The demand for diesel goes up from 7.20 m. tonnes in 1982-83 to 15.5 m. tonnes in 2000-01 A.D. The demand for diesel under assumption III (a) for 2000-01 A.D. declines by about 0.9 m. tonnes when rail-road split is 72 : 28 and by 1.3 m. tonnes when the share is 75 : 25. Even for 1982-83, requirements for diesel decrease by about 0.6 m. tonnes when the shares change from assumption I to assumption IV (b). We may repeat that modal shares under assumption IV are calculated by assuming 50 per cent rise in diesel prices over 1978-79 base. The calculations presented here indicate the magnitude of saving in diesel that could be achieved if modal shares are raised marginally in favour of railways. Although we assume that an increasing proportion of traffic would be moving on electric traction, the demand for electricity on railways will nevertheless increase only marginally.

3.6.3 We compare our energy demand estimates for transport with those given by the Working Group on Energy. While estimates for diesel are fairly comparable to ours for 1982-83, there is a sharp increase in estimates for 2000-01 A.D. As against our highest estimates of 15.5 m. tonnes for 2000-01 A.D. estimates of the Working Group are at 33 m. tonnes at their reference level and 23m. tonnes at the optimal level forecasts. The main reasons for this are the higher level of their traffic forecasts and modal-split in favour of roads.

Table 3.35

Forecast of Energy Demand : Rail and Road (Freight and Passenger Traffic)

Freight		Unit	1982-83	1987-88	1992-93	2000-01
1		2	3	4	5	6
Assumption I						
RAIL						
(a)	Steam	M. tonnes	3.8	3.5	3.0	1.8
(b)	Elec.	M. Kwh	1465	2265	3400	6160

Assumption I — Rail-Road shares in the ratio of 67 : 33

1		2	3	4	5	6
(c)	Diesel	000 Kl.	875	1045	1160	1215
ROAD						
	Diesel	000 Kl.	5410	6800	8680	11385
Assumption III (a)						
RAIL						
(a)	Steam	M. tonnes	4.2	3.8	3.2	1.9
(b)	Elec.	M. Kwh	1570	2430	3660	6630
(c)	Diesel	000 Kl.	940	1120	1245	1310
ROAD						
	Diesel	000 Kl.	4885	6170	7890	10295
Assumption IV (b)						
RAIL						
(a)	Steam	M. tonnes	4.3	3.9	3.4	1.9
(b)	Elec.	M. Kwh	1640	2540	3810	6915
(c)	Diesel	000 Kl.	980	1170	1305	1365
ROAD						
	Diesel	000 Kl.	4590	5775	7130	9670
PASSENGER						
RAIL						
(a)	Steam	M. tonnes	5.2	4.3	3.6	1.3
(b)	Elec.	M. Kwh	1780	2240	3325	5885
(c)	Diesel	000 Kl.	315	485	650	1055
ROAD						
	Diesel	000 Kl.	2045	2635	3350	4960

Assumption III (a) Rail-Road shares in the ratio of 72 : 28

Assumption IV (b) Rail-Road shares in the ratio of 75 : 25

Tadle 3.36

TOTAL ENERGY DFMAND : A SUMMARY

	1982-83			1987-88			1992-93			2000-01		
	Steam (m. to-nnes)	Elec. (mKwh)	Diesel (m. to-nnes)	Steam (m. to-nnes)	Elec. (mKwh)	Diesel (m. to-nnes)	Steam (m. to-nnes)	Elec. (mKwh)	Diesel (m. to-nnes)	Steam (m. to-nnes)	Elec. (mKwh)	Diesel (m. to-nnes)
1	2	3	4	5	6	7	8	9	10	11	12	13
(Assumption I)												
Rail	9.1	3245	0.99	7.8	4505	1.27	6.6	6725	1.50	3.1	12045	1.89
Road	—	—	6.21	—	—	7.86	—	—	10.02	—	—	13.62
Total	9.1	3245	7.20	7.8	4505	9.13	6.6	6725	11.52	3.1	12045	15.51
(Assumption III(a)												
Rail	9.4	3350	1.05	8.1	4670	1.34	6.8	6985	1.58	3.2	12515	1.97
Road	—	—	5.78	—	—	7.34	—	—	9.37	—	—	12.71
Total	9.4	3350	6.83	8.1	4670	8.68	6.8	6985	10.95	3.2	12515	14.68
(Assumption IV(b)												
Rail	9.5	3420	1.08	8.2	4780	1.38	7.0	7135	1.63	3.2	12800	2.02
Road	—	—	5.53	—	—	7.01	—	—	8.73	—	—	12.20
Total	9.5	3420	6.61	8.2	4780	8.39	7.0	7135	10.36	3.2	12800	14.22
(Working Group on Energy Policy) (Ref. level forecast)												
Rail	12.4	3000	1.04	11.0	3960	1.41	7.8	5400	1.99	3.4	8730	3.01
Road	—	—	6.98	—	—	10.12	—	—	15.33	—	—	30.02
Total	12.4	3000	8.02 (7.95)	11.0	3960	11.53 (9.64)	7.8	5400	17.32 (13.29)	3.4	8730	33.03 (23.24)

Assumption I — Rail-road shares in the ratio of 67:33
Assumption III (a)— Rail-road shares in the ratio of 72:28
Vssumption IV (b)— Rail-road shares in the ratio of 75:25

Figures in brackets show the demand for optimal level forecast worked out by the working Group on Energy Policy.

3.7 Policy Implications

3.7.1 Taking into account the present price of diesel and its consequential impact on break-even levels and assuming a shift to rail of no more than 50 per cent of traffic moving by road beyond break-even levels, we find that the share of rail and road in freight traffic changes from 67:33 observed in the last ten years to 72:28. The share of railways would increase further with a rise in diesel prices, and if the assumed share of 50 per cent is increased in favour of rail.

3.7.2 The total transport requirments projected by us for 2000 A.D. would rise to phenomenal levels for both rail and road. According to our projections, road transport would be required to carry 182 b. tonne kms. of traffic, as against the present 80 b. tonne kms. Of this, nearly 130 b. tonne kms. would be intra-regional and 52 b. tonne kms. inter-regional. Railways would be expected to carry 468 b. tonne kms. against the present traffic of 154 b. tonne kms. primarily for long distance.

3.7.3 An increase in rail share from 67 to 72 per cent which we have visualised will not materialise unless appropriate investment and pricing policies are pursued to ensure the suggested modal split. Appropriate policy decisions, therefore, have to be taken in time so that railways are in a position to meet the projected demand for freight, thereby avoiding bottlnecks occurring in the system.

3.7.4 Our assessment of inter-modal allocation also indicates that a preponderant proportion of passenger traffic of around 60 per cent, particularly for short distances, would have to be met by road services. The long distance inter-city and heavy metropolitan commuter traffic would be carried by railways. We also foresee that a proportion of the long distance passenger traffic would be carried by air transport. All this calls for appropriate investment decisions to create adequate capacities in the three main modes of passenger transport.

3.7.5 The Working Group on Energy Policy has estimated an annual requirement of 33 m. tonnes of diesel for railways and road transport in 2000 A.D. at the reference level forecast. The optimal level forecast, based on suggested policy measures, puts the demand at 23 m. tonnes. On the other hand, the demand for diesel for rail and road transport based on our forecasts of traffic and suggested inter-modal mix comes to 14.7 m. tonnes. The reduction is significant. On current prices the savings would amount to over Rs. 3,500 crores per annum linked with the reference level, and around Rs. 1,650 crores with optimal level forecast.

3.7.6 We do not see any major break-through in technology in the foreseeable future to replace petroleum products for traction in the transport sector, nor do we see any other new mode to replace the existing ones. We have thus to optimise existing modes and increasingly use the more energy efficient modes. The demand for petroleum products calculated by us after taking into account resource cost of each mode needs to be met in full. As transport is vital for smooth functioning of the economy, energy requirements given in our assessment are the minimum and must be met on a priority basis.

3.7.7 Our inter-modal allocations are based on calculations of resource costs which take into account shadow price of scarce inputs like energy. In our view, Government should try to change inter modal mix in a desired direction through investment and pricing mechanism rather than through regulations and physical control. If Government wishes to evolve a transport mix, keeping in view long term costs of energy and its availability, it would be socially more efficient to attain policy objectives through properly pricing energy used in transport sector rather than rationing its supply. Regulation and control in any form simply leads to misallocation of scarce resources in transport, instead of improvement in efficiency of the system.

3.8 Summing Up

3.8.1 The inter-modal mix we have suggested is based on the analysis of resource costs of main modes of transport. The computation of resource costs was admittedly a difficult task, as it involved computing cost to the operator, user and society. The cost data we have examined has quantified only the first two components, as the quantification of social cost was not possible because of methodological problems. We also examined energy and employment intensities of various

modes of transport. We hold the view that whatever importance employment generation may have in programmes of development it has no role to play in determination of inter-modal mix in the transport system of the country. Our policy aim should be to develop technologically as efficient a transport system as possible, so that production and hence employment generation programmes of other sectors are not jeopardised due to transport bottlenecks. In today's context, when there is severe energy crisis in the country, we feel it is vitally important that energy conservation should be given overriding consideration in determining inter-modal mix for the transport system in the country.

3.8.2 To determine an appropriate role for each agency of transport on the basis of these criteria, it is necessary to have some idea about future traffic. We have made an attempt to forecast both freight and passenger traffic till the turn of the century. Freight traffic forecasts were produced using four separate methods. These forecasts were then allocated between rail and road on the basis of other assumptions. Two basic scenarios are presented : (a) The share of rail and road in the ratio of 67 and 33 per cent for freight and 40 and 60 per cent for passenger traffic (which was observed during the last decade or so) have been assumed to remain constant until the turn of the century ; and (b) while the share of railways have been raised in varying degrees for freight traffic, it is again assumed to remain constant in relation to road for passenger traffic. The latter scenario is based on resource cost analysis which takes into account the shadow price of energy. It is, therefore, not surprising that modal split given by it should tilt marginally in favour of railways. We have further examined implications of our traffic forecasts and modal splits for energy. These indicate substantial savings of energy if the future inter-modal mix follows the second scenario (under assumptions II to IV given in table 3.34).

3.8.3 If the minimum resource cost, including energy savings, is to be the guiding principle for determining inter-modal mix, we should recommend a larger role for railways in the nation's transport system. When we discuss the role of railways in subsequent pages, we make a case for electrification of more railway routes on the same consideration. Similarly, other energy-saving modes, such as, inland water transport, coastal shipping, ropeways, pipelines and trolley buses in urban areas, will also have to be given greater encouragement than in the past, although in totality these modes may not form a significant part of the transport system.

3.8.4 For achieving the best inter-modal mix we suggest that appropriate investment decisions and use of pricing mechanism should have preference over regulatory measures and administrative controls.

ANNEXURE 3.

List of Commodity Groups for Which Costs have been Computed

Sl. No.	Category	Representative Commodity/Commodity Composition of the group
1	2	3
1.	A	WHEAT Rice, Paddy, Rice Flour, Rice Parched, Wheat, Wheat Flour, Bulgar Wheat, Gram including gram products except flour, Pulses other than Gram, Gram Flour. Bajra, Bajra Flour, Maize, Millets, Barley (with or without husk), Raggi, other grains, Starch N. O. C. Groundnut Seeds (with or without shells), Castor Seeds, Til or Gingelly Seeds, Copra (Coconut kernel), Mohwa Seeds, other oil seeds.
2.	B	COTTON (RAW) Raw Cotton, Cotton (full or half pressed), Loose ginned/unginned (Indian or foreign), Cotton Waste Loose. Raw Jute (full or half pressed), waste & cuttings unpressed.
3.	C	POTATOES Mangoes, Plantains, Oranges, other fresh fruits, Vegetables fresh, Coconut, Potatoes, Onions.
4	D	COAL Coal, Iron Ore, Manganese Ore, Lime Stone & Dolomite, Gypsum, other stones including Marble, Ballast, Grind-stone Stone Roller, other stones (N.O.C.), Stone-ware, Pipes, other Stone-ware, Marble Tiles, Marble Powder, Stone polished Marble. Other Ores except Coal, Manganese, Lime Stone, Dolomite, Gypsum, Stone & Marble.
5.	E	FERTILISER (Urea) Ammonium Sulphate, Super Phosphates and other chemical manures.
6.	F	SUGAR Sugar, Sugar Candy, Glucose, Khandsari, Gur Jaggery, Gur-shakkar.
7.	G	PETROLEUM (HSD) Crude Petroleum, Crude oil in bulk and tins, Diesel oil in bulk & tins, Kerosene oil in bulk & tins.

Annexure 3.1 (Contd.)

1	2	3
		Petrol in bulk & tins, including motor spirits, Aviation Turbine Fuel (A.T.F.), Aviation Spirit, Gasoline, Special Boiling Spirit (S.B.P.), Other Fuel oils, Lubricating oil, Furnace oil and other mineral oils.
		Vanaspati Oil : Hydrogenated Oils (Vanaspati).
		Other edible oils : Groundnut oil, Mustard oil, Linseed oil, Coconut oil, Til oil, Castor oil, Gingelly oil, oils excluding hydrogenated oils.
8.	H	TEA
		Tea, Coffee, Chicory Powder, Other drinks (no separate classification).
9.	I	COTTON TEXTILES
		Cotton Piece, Goods, Cotton Thread, Other cotton manufactured, Readymade Garments.
10.	J	CEMENT
		Cement in bags or bulk, Clinker.
11.	K	LIVESTOCK (Buffaloes)
		Calves, Cattle, Horses, Ponies, Mules, Sheep, Goats, Elephants, Camels.
12.	L	STEEL TUBES & PIPES
		Pig Iron, Cast Iron, Iron & Steel other than Pig Iron, including Iron & Steel/Scrap.
		Tin, Brass, Bell Metal, Copper, Zinc, Lead, Aluminum & other non-ferrous metals. Teakwood, other timber.
13.	M	SMALL MACHINERY, PACKAGES, DRUMS ETC.
		Machinery other than Electric Implements, Agricultural Implements.
		Chemicals & Drugs : Soda Caustic, Soda-ash, Industrial & Power Alcohol, Acids, Medicines, Drugs including Opium. **Paints & Dyes :** Paints, Varnishes, Tanning extracts and other paints, Coaltar & Bitumen.
		Milk & Milk Products : Milk, Ghee, Milk products, Charcoal, Firewood & other wood. Provisions & House hold goods : Fruits dried, Eggs, Meat Products (other than Meat Manures). Fish, Pepper, Turmeric, Chillies, Cardamom, Ginger dry, Other Spices, Coconut dry, Betelnuts, Seeds other than Oil Seeds, Groceries (other than Sugar, Tea, Salt, Gur, Coffee, Biscuit, Aniseed).

Annexure 3.1 (Contd.)

1	2	3
		Manufactures : Electric Implements & Fixtures : Fans, Motors, Bulbs, Refrigerators, Batteries & other fixture, TVs'
		Tyrers & Tubses : For Automobiles : no classificat!on. For Cycles : all rubber tyres & tubes.
		Leather Goods : Leather manufactures, Tanned Hides & Skins.
		Footwear : Footwear
		Motor Cycles & Scooters : Motor Cars including Taxi Cars, Scooters.
		Jute manufactures : Gunny Sacks, Hessian Cloth, Jute manufactures.
		Miscellaneous : News-print, other papers, Pulp Boards, other stationery ttems, Hard Board.
		Other Commodities : Wool Raw (full or half pressed), Wool Raw (loose), Silk Raw, Sllk Waste, Hemp and Fibres unpressed, Rubber Crude, Rubber Raw, Rubber Scrap, Myrobalam, Mohwa Flower, Cinematograph Films (inflammable, non-inflammable), Malt extract, Ovaltine, Resin, Carbon Black, Carpet, Carving Wood, Thermocol, Iron & Steel Slag.

Note : The 13 categories A to M listed above cover almost all freight traffic. There are, however, a few commodities which have marginal variations in the transport characteristics (and, therefore, transport costs). These constitute comparatively insignificant proportion of the total freight traffic. For costing purpose, these have been classified below against the specific category resembling them most :

Sl. No.	Commodity not categorised	Nearest category applicable	Remark
1	2	3	4
1.	**Tobacco :**		
	Tobacco (country) unmanufactured	Small Machinery, packages, Drums etc. under category M.	Uumanufactured country tobacco is transported in bags like fibres unpressed listed under category M.
2.	**Forest Products**		
	Bamboo, Bamboo Chips, Bamboo split Timber, Teakwood, other similar wood.	Steel Tubes & Pipes under category L.	Commodities such as timber and sugarcane have their own peculiar characteristics. Such commodities, however, have a low share in the total transport requirements. It has not been possible to conduct specific

(Annexure 3.1 Contd-)

1	2	3	4
3.	**Sugarcane**		users cost studies for these commodities. Consequently for the present study, the user cost characteristics of commodities resembling them losest have been assumed. Steel pipes and tubes on account of the nature of handling required are considered closest to these commodities for this purpose.
4.	Salt	Wheat under Category A	Packing and transport characteristics are same as those of foodgrains.
5.	Buildiug material, Sanitaryware & Fixtures, Asbestos Sheets	Small Machinery, packages, Drums etc. under category M.	The packing & transport characteristics are similar to those of small machinery, electric implements and fixtures in case of sanitaryware and fixtures.
6.	**Fodder :**		
	Fodder, Grass Dry & Green, other fodder	Coal under category D	See remarks under item 2 above. Its handling characteristics are different from those of any other commodity considered in this study. However, coal may be considered closest to these commodities.
	Coconut oil Cakes, Groundnut Cakes, Cotton Seed Cakes, Gingelly Seed Cake, Mustard Cake, Castor Cake and other oil Cakes, Bran, Husks of Gram & Pulses.	Wheat under category A	The consignments are bagged and moved in a manner similar to that in case of foodgrains.
7.	Animal products Hides & Skins : Hides (dry & wet) Skins (dry & wet), Bones (raw, meal)	Small Machinery, Pakages, Drums etc. under category M.	Even though the commodity has a distinctive nature as offensive goods, the packing arrangements etc. are akin to those of leather goods, tanned hides listed under category M.

Annexure 3.2

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Traction (Distance Slab in kms)	Commodities					
	Cotton Textiles			Cement		
	Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost
1	2	3	4	5	6	7
A. Railway (Block Load)						
Diesel Single Line						
50	16.81	205.66	222.47	13.96	30.94	44.90
300	32.76	216.79	249.55	26.94	30.99	57.93
650	55.36	235.26	290.62	45.30	31.07	76.37
950	77.94	254.37	329.31	61.19	31.14	92.33
1250	93.96	267.38	361.34	76.68	31.20	107.88
Diesel Double Line						
50	16.80	205.66	222.46	13.97	30.94	44.91
300	33.15	216.79	249.94	27.31	30.99	58.30
650	56.31	235.26	291.57	46.17	31.07	77.24
950	76.37	254.37	330.74	62.49	31.14	93.63
1250	95.87	267.38	363.25	78.41	31.20	109.61
Electric Double Line						
50	15.71	205.66	221.37	13.03	30.94	43.97
300	26.28	216.77	243.07	21.40	30.99	52.39
650	41.29	235.26	276.55	33.21	31.07	64.28
950	54.41	254.37	308.78	43.63	31.14	74.77
1250	67.06	267.38	334.44	53.66	31.20	84.86
B. Railway (Wagon Load)						
Diesel Single Line						
50	26.00	231.90	257.90	20.41	31.05	51.46
300	42.39	243.66	286.05	33.64	31.10	64.74
650	67.56	280.61	348.17	53.83	31.25	85.08
950	89.56	315.45	405.01	71.43	31.39	102.82
1250	108.58	326.58	435.16	86.92	31.44	118.36

Annexure 3.2 (Contd)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Commodities (Contd)								
Livestock (Buffaloes)			Steel Tubes & Pipes			Small Machinery, Packaging, Drum, etc.		
Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost
8	9	10	11	12	13	14	15	16
A. Railway (Block Load)								
Diesel Single Line								
36.47	15.87	52.34	14.49	46.84	61.33	33.33	148.53	181.86
72.11	16.62	88.73	31.29	47.58	78.87	49.89	149.62	199.51
122.81	17.87	140.68	55.04	48.78	103.82	73.35	151.42	224.77
166.92	19.16	186.08	75.61	50.85	126.46	93.69	153.29	246.98
209.30	20.03	229.33	95.64	50.91	146.55	113.42	154.56	267.98
Diesel Double Line								
36.33	15.87	52 20	14.56	46.84	61.40	33.32	148.53	181.85
72.67	16.62	89.29	31.80	47.58	79.38	50.28	149.62	199.80
124.33	17.87	142 20	56.18	48.78	104.96	74.32	151.42	225.74
169.27	19.16	188.43	77.28	50.05	127.33	95.14	153.29	248.43
212.48	20.03	232.51	97.84	50.91	148.74	115.37	154.56	269.93
Electric Double Line								
34.25	15.87	50.12	13.32	46.84	60.16	32.20	148.53	180.73
59.09	16.62	75.71	24.28	47.58	71.86	43.21	149.62	192.83
94.51	17.87	112.38	39.85	48.78	88.63	58.85	151.42	210.27
125.61	19.16	144.77	53.43	50.05	103.48	72.51	153.29	225.80
155.32	20.03	175.35	66.56	50.91	117.47	85.69	154.56	240.25
B. Railway (Wagon Load)								
Diesel Double Line								
64.78	17.64	82.42	24.02	49.66	73.68	42.16	151.09	193.25
102.16	18.43	120.59	41.19	50.44	91.63	59.19	152.24	291.43
160.69	20.92	181.61	67.20	52.88	120.08	85.39	155.85	241.24
212.13	23.27	235.40	89.87	55.18	145.05	108.30	159.25	267.55
254.51	24.02	278.53	109.89	55.92	165.81	128.03	160.34	288.37

Annexure 3.2 (Contd)

Comparative Resource Cost of Rail and Road

Rs./per tonne

Traction (Distance Slab in kms)	Commodities: Cotton Textiles			Cement		
	Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost
1	2	3	4	5	6	7
B. (Railway Wagon Load)						
Diesel Double Line						
50	26.00	231.90	257.90	20.44	31.05	51.49
300	42.88	243.66	286.54	34.11	31.10	65.21
650	68.53	280.61	349.14	54.74	31.25	85.99
950	90.92	315.45	406.37	72.70	31.39	104.09
1250	110.41	326.58	436.99	88.62	31.44	120.06
Electric Double Line						
50	24.70	231.90	256.60	19.36	31.05	50.41
300	35.82	243.66	279.48	28.10	31.10	59.20
650	53.41	280.61	334.02	41.81	31.25	73.06
950	68.92	315.45	384.37	53.86	31.39	85.25
1250	81.47	326.58	408.05	63.82	31.44	95.26
C. Highways (Plain terrain)						
Section I						
50	13.90	129.49	143.39	12.00	21.87	33.87
300	51.29	139.35	190.64	43.61	21.91	65.52
650	89.51	153.21	242.72	75.90	21.96	97.86
950	117.57	163.49	281.06	99.61	22.01	121.62
1250	149.53	174.83	324.36	126.63	22.05	148.68
Section II						
50	14.02	129.49	143.51	12.10	21.87	33.97
300	51.90	139.35	191.25	44 12	21.91	66.03
650	90.69	153.21	243.90	76.90	21.96	98.86
950	119.15	163.49	282.64	100.94	22.01	122.95
1250	151.53	174.83	326.36	128.33	22.05	150.38

Annexure 3.2 (Contd)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Commodities (Contd)								
Livestock (Buffaloes)			Steel Tubes & Pipes			Small Machinery, Packaging Drum etc.		
Oper-tor Cost	User Cost	Total Cost	Opera-tor Cost	User Cost	Total Cost	Opera-tor Cost	User Cost	Total Cost
8	9	10	11	12	13	14	15	16
B. Railway (Wagon Load)								
Diesel Double Line								
64.58	17.64	82.22	24.07	49.66	73.73	42.15	151.09	193.24
102.84	18.43	121.27	41.79	50.44	92.23	59.69	152.24	211.93
162.06	20.92	182.98	68.36	52.88	121.24	86.37	155.85	242.22
214.06	23.27	237.23	91.49	55.18	146.67	109.67	159.25	268.92
257.27	24.02	281.29	112.04	55.92	167.96	129.89	160.34	290.23
Electric Double Line								
61.73	17.64	79.37	22.73	49.66	72.39	40.81	151.09	191.90
58.45	18.43	106.88	34.22	50.44	84.66	52.41	152.24	204.65
131.69	20.92	152.61	52.03	52.88	104.91	70.78	155.85	226.63
170.07	23.27	193.34	67.69	55.18	122.87	86.99	159.25	246.24
199.48	24.02	223.50	80.72	55.92	136.64	100.06	160.34	260.40
C. Highways (Plain Terrain)								
Section I								
28.69	1.98	30.67	12.70	36.53	49.23	20.34	136.59	156.93
111.46	2.64	114.10	46.47	37.18	83.65	59.99	137.55	197.54
196.05	3.58	199.63	80.97	38.10	119.07	101.29	138.90	240.10
258.11	4.27	262.38	106.29	38.78	145.07	132.12	139.91	272.03
328.89	5.04	333.93	135.17	39.52	174.69	166.79	141.01	307.80
Section II								
28.96	1.98	30.94	12.80	36.53	49.33	20.46	136.59	157.05
112.81	2.64	115.45	47.02	37.18	84.20	67.50	137.55	205.05
198.64	3.58	202.22	82.02	38.10	120.12	102.54	138.90	241.44
261.59	4.27	265.86	107.72	38.78	146.50	133.70	139.91	273.61
333.33	5.04	338.37	136.98	39.52	176.50	168.79	141.01	309.80

Annexure 3.2 (Contd)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Traction (Distance Slab in kms)	Commodities					
	Wheat			Cotton (Raw)		
	Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost
1	2	3	4	5	6	7
A. Railways (Block Load)						
Diesel Single Line						
50	13.77	28.89	42.66	16.80	93.06	109.86
300	27.11	29.11	56.22	32.70	94.57	127.27
650	45.98	29.47	75.45	55.23	97.09	152.32
950	62.31	29.84	92.15	74.75	99.70	174.45
1250	78.23	30.10	108.33	93.71	101.47	195.18
Diesel Double Line						
50	13.78	28.89	42.67	16.79	93.06	109.85
300	27.48	29.11	56.59	33.09	94.57	127.66
650	46.85	29.47	76.32	56.18	97.09	153.27
950	63.62	29.84	93.46	76.18	99.70	175.88
1250	79.97	30.10	110.07	95.62	101.47	197.09
Electric Double Line						
50	12.83	28.89	41.72	15.70	93.06	108.76
300	21.54	29.11	50.65	26.22	94.57	120.79
650	33.90	29.47	63.37	41.16	97.69	138.25
950	44.66	29.84	74.50	54.22	99.70	153.92
1250	55.09	30.10	85.19	66.81	101.47	168.28
B. Railways (Wagon Load)						
Diesel Single Line						
50	20.56	29.40	49.96	25.99	96.64	122.63
300	34.16	29.63	63.79	42.33	98.24	140.57
650	54.88	30.36	85.24	67.43	103.28	170.71
950	72.94	31.04	103.98	89.37	108.03	197.40
1250	88.86	31.26	120.12	108.33	109.54	217.87

Annexure 3.2 (Contd.)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Commodities (Contd)					
Potatoes			Coal		
Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost
8	9	10	11	12	13
A. Railways (Block Load)					
Diesel Single Line					
17.59	37.34	54.93	15.23	14.19	29.42
35.30	37.41	72.71	30.43	14.24	44.67
60.37	37.53	97.90	51.97	14.31	66.28
82.09	37.66	119.75	70.63	14.39	85.02
103.20	37.75	140.95	88.75	14.44	103.19
Diesel Double Line					
17.57	37.34	54.91	15.24	14.19	29.43
35.69	37.41	73.10	30.84	14.24	45.08
61.33	37.53	98.86	52.92	14.31	67.23
83.54	37.66	121.20	72.05	14.39	86.44
105.15	37.75	142.90	90.64	14.44	105.08
Electric Double Line					
16.46	37.34	53.80	14.18	14.19	28.37
28.62	37.41	66.03	26.25	14.24	40.49
45.87	37.53	83.40	28.36	14.31	52.67
60.91	37.66	98.57	50.75	14.39	65.14
75.47	37.75	113.22	62.72	14.44	77.16
B. Railways (Wagon Load)					
Diesel Single Line					
27.30	37.51	64.81	22.12	14.30	36.42
45.48	37.59	83.07	37.72	14.34	52.06
73.29	37.83	111.12	61.41	14.49	75.90
97.58	38.06	135.64	82.07	14.63	96.70
118.69	38.13	156.82	100.19	14.67	114.86

Annexure 3.2 (Contd)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Traction (Distance Slab in Kms)	Commodities					
	Wheat			Cotton (Raw)		
	Operator Cost	User Cost	Total Cost	Operator Cost	User Cost	Total Cost
1	2	3	4	5	6	7
B. Railways (Wagon Load)						
Diesel Double Line						
50	20.58	29.40	49.98	25.99	96.64	122.63
300	34.62	29.63	64.25	42.82	98.24	141.66
650	55.78	30.36	86.14	68.40	103.28	171.68
950	74.21	31.04	105.25	90.73	108.03	198.76
1250	90.56	31.26	121.82	110.16	109.54	219.70
Electric Double Line						
50	19.50	29.40	48.90	24.69	96.64	121.33
300	28.58	29.63	58.21	35.76	98.24	134.00
650	42.78	30.36	73.14	53.28	103.28	156.56
950	55.27	31.04	86.31	68.73	108.03	176.76
1250	65.63	31.26	96.89	81.22	109.54	190.76
C. Highways (Plain Terrain)						
Section I						
50	12.40	15.48	27.88	14.15	64.25	78.40
300	45.22	15.67	60.89	52.37	65.59	117.96
650	78.77	15.94	94.71	91.42	67.48	158.90
950	103.39	16.14	119.53	120.07	68.88	188.95
1250	131.48	16.37	147.85	152.76	70.43	223.19
Section II						
50	12.50	15.48	27.98	14.27	64.25	78.52
300	45.76	15.67	61.43	53.00	65.59	118.59
650	79.80	15.94	95.74	92.42	67.48	159.90
950	104.77	16.14	120.91	121.67	68.88	190.55
1250	133.24	16.37	149.61	154.81	70.43	225.24

Annexure 3.2 (Contd)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Commodities (Contd)					
Potatoes			Coal		
Operator Cost	User Cest	Total Cost	Operator Cost	User Cost	Total Cost
8	9	10	11	12	13
B. Railways Double Line					
Diesel Double Line					
27.29	37.51	64.80	22.16	14.30	36.46
45.98	37.59	83.57	38.24	14.34	52.58
74.27	37.83	112.10	62.41	14.49	76.90
98.95	38.06	137.01	83.48	14.63	98.11
120.55	38.13	156.68	102.07	14.67	116.74
Electric Double Line					
25.95	37.51	63.46	20.97	14.30	35.27
38.70	37.59	76.29	31.47	14.34	45.81
58.68	37.83	96.51	47.42	14.49	62.31
76.28	38.06	114.34	62.20	14.63	76.83
90.73	38.13	128.86	74.07	14.67	88.74
C. Highways (Plain Terrain)					
Section I					
12.97	25.44	38.41	12.02	5.63	17.65
47.50	25.51	73.01	43.65	5.66	49.31
82.85	25.60	108.45	67.17	5.72	81.89
108.83	25.67	134.50	100.00	5.76	105.76
138.40	25.74	164.14	127.14	5.80	132.94
Section II					
13.08	25.44	38.52	12.12	5.63	17.75
48.06	25.51	73.57	44.24	5.66	49.90
83.93	25·60	109.53	77.14	5.72	82.86
110.28	25.67	135.95	101.33	5.76	107.09
140.24	25.74	165.98	128.84	5.80	134.64

Annexure 3.2 (contd.)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Traction (Distance Slab in km	Commodities					
	Fertiliser (Urea)			Sugar		
	Operator cost	User cost	Total cost	Operator cost	User cost	Total cost
1	2	3	4	5	6	7
A. Railways (Block Load)						
Diesel Single Line						
50	14.10	43.59	57.69	14.48	23.03	37.51
300	27.23	43.85	71.08	28.86	23.57	52.43
650	45.80	44.29	90.09	49.18	24.46	73.64
950	61.88	44.74	106.62	66.67	25.39	92.06
1250	77.54	45.05	122.59	83.93	26.03	109.96
Diesel Double Line						
50	14.11	43.59	57.70	34.48	23.03	37.51
300	27.60	43.85	71.45	29.23	23.57	52.80
650	46.68	44.29	90.97	50.06	24.46	74.52
950	63.18	44.74	107.92	68.08	25.39	93.47
1250	79.27	45.05	124.32	85.67	26.03	111.70
Electric Double Line						
50	13.16	43.59	56.57	13.53	23.03	36.56
300	21.64	43.85	65.49	23.22	23.57	46.79
650	33.67	44.29	77.96	36.94	24.46	61.40
950	44.16	44.74	88.90	48.89	25.39	74.28
1250	54.32	45.05	89.37	60.50	26.03	86.53
B. Railway (Wagon Load)						
Diesel Single Line						
50	20.70	44.21	64.91	21.22	24.30	45.52
300	34.09	44.49	78.58	35.87	24.87	60.74
650	59.52	45.36	99.88	58.10	26.67	84.77
950	72.34	46.18	118.52	77.47	28.36	105.83
1250	88.00	46.44	134.44	94.63	28.90	123.53

Annexure 3.2 (Contd.)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Commodities (contd)					
Petrolium (HSD)			Tea		
Operator cost	User cost	Total cost	Operator cost	User cost	Total cost
8	9	10	11	12	13
A. Railways (Block Load)					
Diesel Single Line					
15.33	12.95	28.28	20.74	258.31	279.05
35.74	13.13	48.87	24.50	260.80	305.30
64.56	13.44	78.00	78.10	264.95	343.05
89.55	13.75	103.30	107.18	269.23	376.41
113.82	13.97	127.79	135.52	272.15	407.67
Diesel Double Line					
15.43	12.95	28.38	20.71	258.31	279.02
36.36	13.13	49.49	44.91	260.80	305.71
65.90	13.44	79.34	79.13	264.95	344.08
91.49	13.75	105.24	108.75	269.23	377.98
116.38	13.97	130.35	137.62	272.15	409.77
Electric Double Line					
13.94	12.95	26.89	19.48	258.31	277.79
27.43	13.13	40.56	37.03	260.80	297.83
46.55	13.44	59.99	61.88	264.95	326.83
63.26	13.75	77.01	83.50	269.23	352.73
79.35	13.97	93.32	104.52	272 15	376.67
B. Railways (Wagon load)					
Diesel Single Line					
27.85	13.77	41.62	32.83	264.19	297.02
48.75	13.96	62.71	57.21	266.83	324.04
80.38	14.57	94.95	94.18	275.12	369.30
107.94	15.14	123.08	126.42	282.93	409.35
132.20	15.33	147.52	154.76	285.43	440.19

Annexure 3.2 (contd.)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Traction (Distance Slab in km	Commodities					
	Fertiliser (Urea)			Sugar		
	Operator cost	User cost	Total cost	Operator cost	User cost	Total cost
1	2	3	4	5	6	7
B. Railways (Wagon Load)						
Diesel Double Line						
50	20.72	44.21	64.93	21.24	24.30	45.54
300	34.55	44.49	79.04	36.34	24.87	61.21
650	55.43	45.36	100.79	59.01	26.67	85.68
950	73.62	46.18	119.80	78.75	28.36	107.11
1250	89.71	46.44	136.15	96.34	28.90	125.24
Electric Double Line						
50	19.64	44.21	63.85	24.14	24.30	44.44
300	28.49	44.49	72.98	30.22	24.87	55.09
650	42.39	45.36	87.75	45.85	26.67	72.52
950	45.61	46.18	100.79	59.57	28.36	87.93
1250	64.69	46.44	111.13	71.10	28.90	100.00
C. Highways (Plain Terrain)						
Section I						
50	12.73	33.25	45.98	12.41	13.51	25.92
300	46.65	33.49	80.14	45.32	13.99	59.31
650	81.36	33.81	115.17	78.99	14.66	93.65
950	106.86	34.06	140.92	103.72	15.16	118.88
1250	135.92	34.32	170.24	131.89	15.71	147.60
Section II						
50	12.83	33.25	46.08	12 51	13.51	26.02
300	47.20	33.49	80.69	45.86	13.99	59.85
650	82.41	33.81	116.22	80.02	14.66	94.68
950	108.29	34.06	142.35	105.10	15.16	126.26
1250	137.73	34.32	172.05	133.65	15.71	149.36

Annexure 3.2 (Contd.)

Comparative Resource Cost of Rail and Road

(Rs./per tonne)

Commodities (contd)					
Petrolium (HSD)			Tea		
Operator cost	User cost	Total cost	Operator cost	User cost	Total cost
8	9	10	11	12	13
B. Railways (Wagon Load)					
Diesel Double Line					
27.92	13.77	41.69	32.79	264.19	296.98
49.47	13.96	63.43	57.73	266.83	324.56
81.73	14.57	96.30	95.21	275.12	370.33
109.83	15.14	124.97	127.87	282.93	410.80
134.70	15.33	150.03	156.73	285.43	442.16
Electric Double Line					
26.32	13.77	40.09	31.26	264.19	295.45
40.49	13.96	54.45	49.57	266.83	316.40
62.38	14.57	76.95	77.79	275.12	352.91
81.62	15.14	96.76	102.54	282.93	385.47
97.60	15.33	112.93	123.43	285.43	408.86
C. Highways (Plain Terrain)					
Section I					
...	...	...	14.25	226.56	240.81
...	...	...	52.96	228.77	281.73
...	...	...	92.70	231.88	324.58
...	...	...	121.93	234.19	356.12
...	...	...	155.21	236.73	391.94
Section II					
...	...	...	14.37	226.56	240.93
...	...	...	53.59	228.77	282.36
...	...	...	93.71	231.88	325.59
...	...	...	123.63	234.19	357.82
...	...	...	157.26	236.73	393.99

Note :— In the case of Highways, the movement of Petroleum (HSD) is mostly confined to trip lengths less than 50 kms distance and accordingly Unit Costs have not been estimated.

Annexure 3.3.A

Unit Economic Cost Passenger Traffic-Railways (1976-77)

Mail/Express Train Services

(Rs. per Passenger)

Description	Cost Item	Distance (Kms) 50	100	150	200	250	300
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Broad Gauge							
1. Electric Traction							
Version I	User	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)
	Operator	3.24	5.42	7.59	9.76	11.94	14.11
	Total	5.28 (5.97)	7.46 (8.15)	9.63 (10.32)	11.80 (12.49)	13.98 (14.67)	16.15 (16.84)
Version II	User	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)
	Operator	3.24	5.42	7.59	9.76	11.94	14.11
	Total	6.00 (6.16)	8.18 (8.34)	10.35 (10.51)	12.52 (12.68)	14.70 (14.86)	16.87 (17.03)
2. Diesel Traction							
Version I	User	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)
	Operator	3.44	5.81	8.17	10.54	12.91	15.28
	Total	5.48 (6.17)	7.85 (8.54)	10.21 (10.90)	12.58 (13.27)	14.95 (15.64)	17.32 (18.01)
Version II	User	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)
	Operator	3.44	5.81	8.17	10.54	12.91	15.28
	Total	6.20 (6.36)	8.57 (8.73)	10.93 (11.09)	13.30 (13.46)	15.67 (15.83)	18.04 (18.20)

Annexure 3.3.A (Contd.)

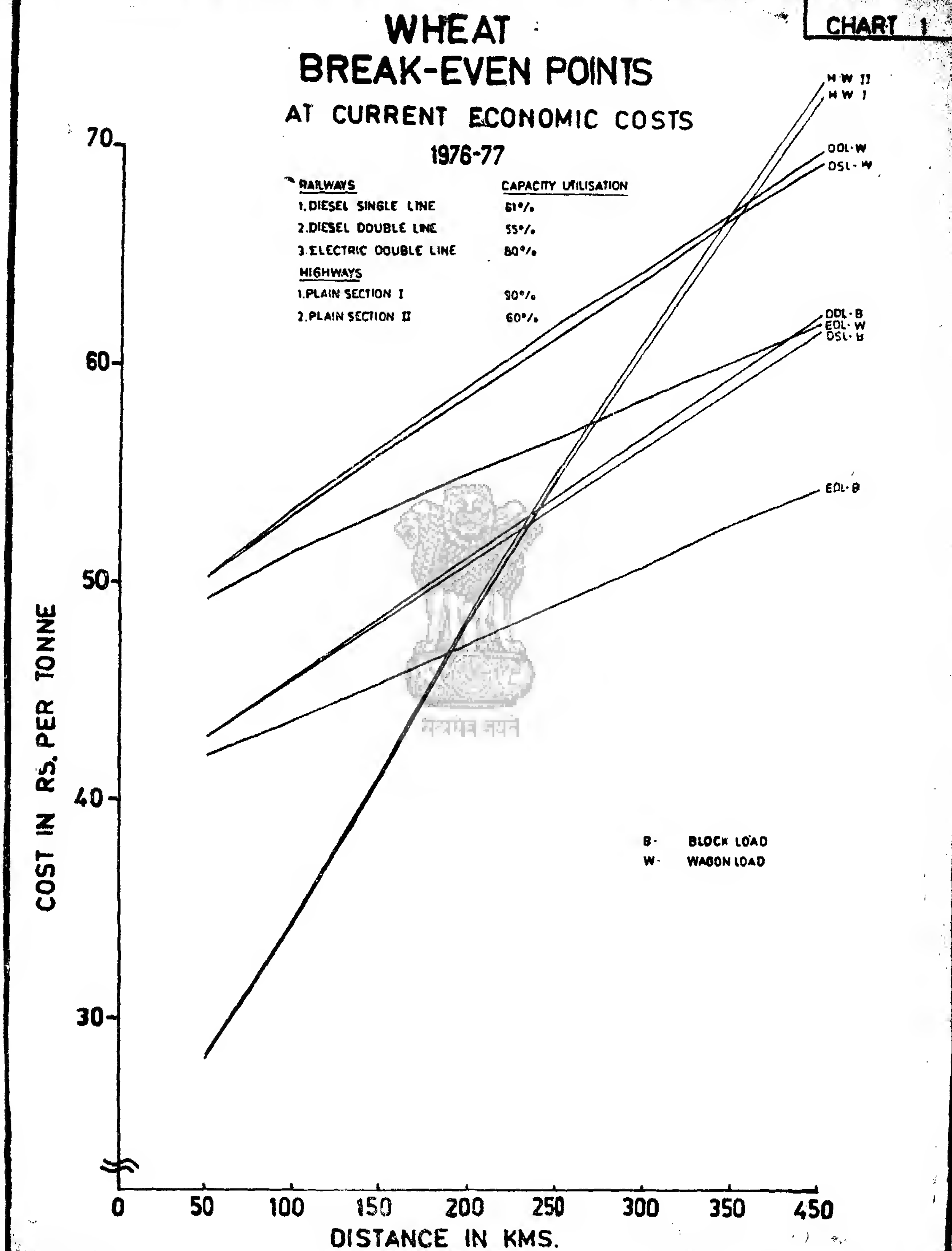
1	2	3	4	5	6	7	8
B. Metre Gauge							
1. Diesel Traction							
Version I	User	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)
	Operator	4.66	7.78	10.88	13.98	17.09	20.19
	Total	6.70 (7.39)	9.82 (10.51)	12.92 (13.61)	16.02 (16.71)	19.13 (19.82)	22.23 (22.92)
Version II	User	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)
	Operator	4.66	7.78	10.88	13.98	17.09	20.19
	Total	7.42 (7.58)	10.54 (10.70)	13.64 (13.80)	16.74 (16.90)	19.85 (20.01)	22.95 (23.11)
2. Steam Traction							
Version I	User	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)	2.04 (2.73)
	Operator	6,30	10.41	14.52	18.65	22.76	26.89
	Total	8.34 (9.03)	12.45 (13.14)	16.56 (17.25)	20.69 (21.38)	24.80 (25.49)	28.92 (29.61)
Version II	User	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)	2.76 (2.92)
	Operator	6.30	10.41	14.52	18.65	22.76	26.88
	Total	9.06 (9.22)	13.17 (13.33)	17.28 (17.44)	21.42 (21.57)	25.52 (25.68)	29.64 (29.80)

N.B.—(i) Version I : Movement between two mofussil towns.

(ii) Version II : Movement between a metropolitan city and a mofussil town.

(iii) Figures in parentheses are calculated on the basis of average of user costs as obtained in the case of Railway and Highway passengers.

CHART 1



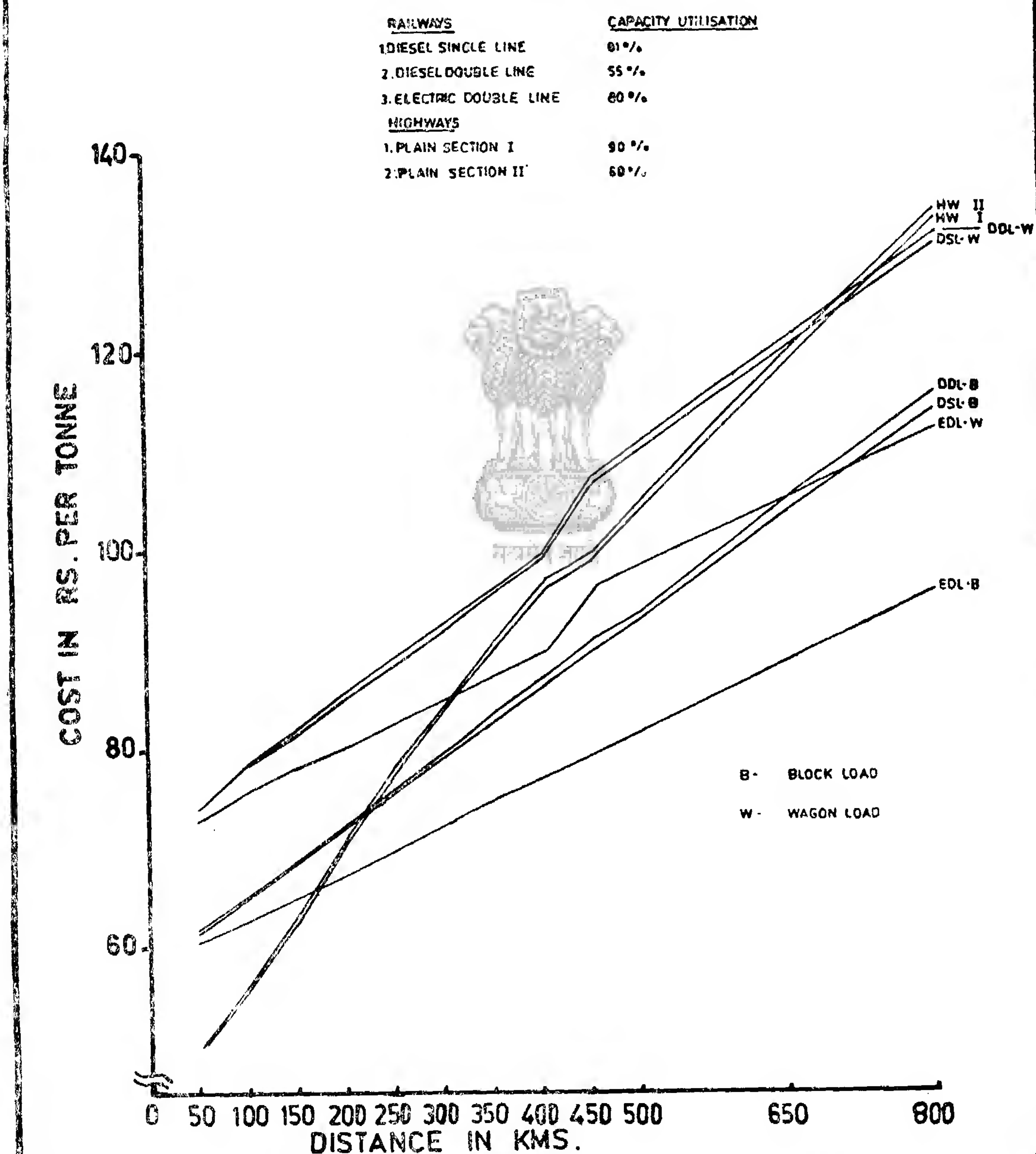
WHEAT
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77
RAILWAYS
CAPACITY UTILISATION
1. DIESEL SINGLE LINE
61%
2. DIESEL DOUBLE LINE
55%
3. ELECTRIC DOUBLE LINE
80%
HIGHWAYS
1. PLAIN SECTION I
90%
2. PLAIN SECTION II
60%
H W II
H W I
DDL-W
DSL-W
DDL-B
EDL-W
DSL-B
EDL-B
B- BLOCK LOAD
W- WAGON LOAD
70
60
50
40
30
COST IN RS. PER TONNE
0
50
100
150
200
250
300
350
450
DISTANCE IN KMS.

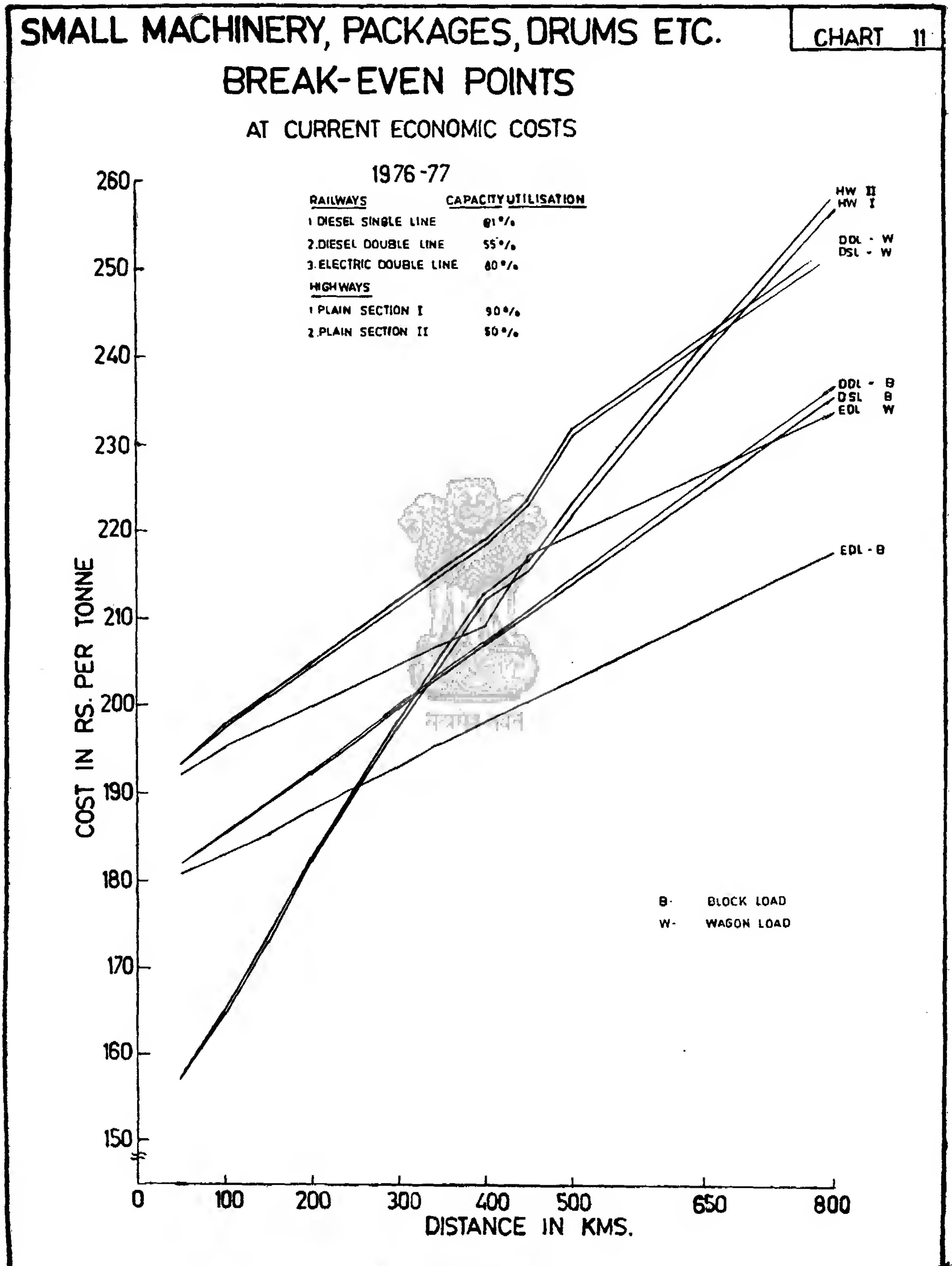
CHART-10

STEEL TUBES BREAK-EVEN POINTS

AT CURRENT ECONOMIC COSTS

1976-77




SMALL MACHINERY, PACKAGES, DRUMS ETC.
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
CHART 11
1976-77
RAILWAYS
CAPACITY UTILISATION
1 DIESEL SINGLE LINE 81%
2.DIESEL DOUBLE LINE 55%
3.ELECTRIC DOUBLE LINE 80%
HIGHWAYS
1 PLAIN SECTION I 90%
2 PLAIN SECTION II 50%
HW II
HW I
DDL - W
DSL - W
DDL - B
DSL B
EDL W
EDL - B
B- BLOCK LOAD
W- WAGON LOAD
COST IN RS. PER TONNE
DISTANCE IN KMS.
260
250
240
230
220
210
200
190
180
170
160
150
0
100
200
300
400
500
650
800

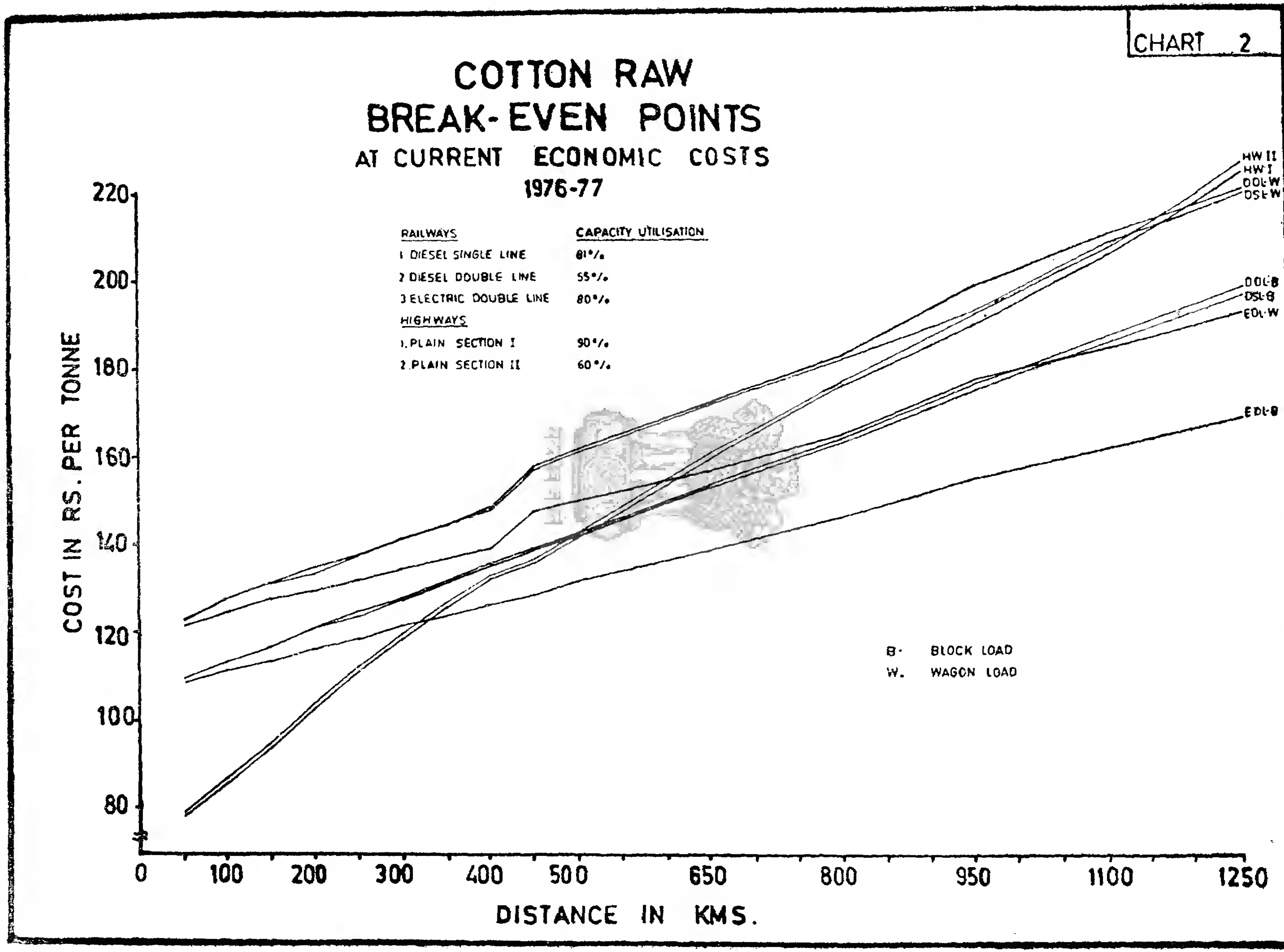


CHART 2
COTTON RAW
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77
RAILWAYS
1 DIESEL SINGLE LINE
2 DIESEL DOUBLE LINE
3 ELECTRIC DOUBLE LINE
HIGHWAYS
1. PLAIN SECTION I
2. PLAIN SECTION II
CAPACITY UTILISATION
81%
55%
80%
90%
60%
B. BLOCK LOAD
W. WAGON LOAD
HW II
HW I
DOL-W
DSL-W
DOL-B
DSL-B
EDL-W
EDL-B
COST IN RS. PER TONNE
220
200
180
160
140
120
100
80
0
100
200
300
400
500
650
800
950
1100
1250
DISTANCE IN KMS.

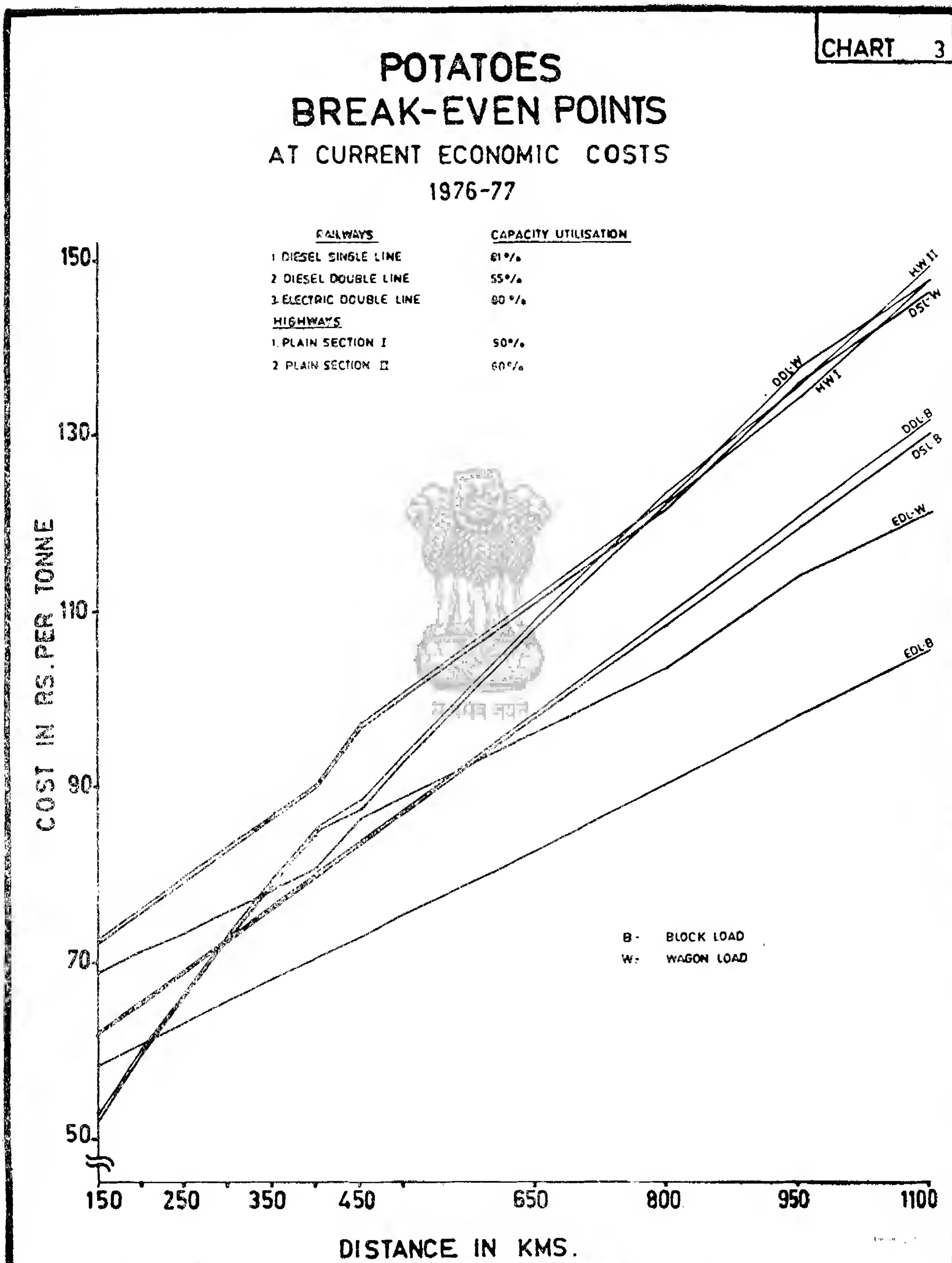


CHART 3
POTATOES
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77
RAILWAYS
CAPACITY UTILISATION
1 DIESEL SINGLE LINE
61%
2 DIESEL DOUBLE LINE
55%
3 ELECTRIC DOUBLE LINE
80%
HIGHWAYS
1 PLAIN SECTION I
50%
2 PLAIN SECTION II
60%
HW II
DSL-W
DDL-W
HW I
DDL-B
DSL-B
EDL-W
EDL-B
B - BLOCK LOAD
W - WAGON LOAD
COST IN RS. PER TONNE
150
130
110
90
70
50
150
250
350
450
650
800
950
1100
DISTANCE IN KMS.

CHART 4

COAL
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77

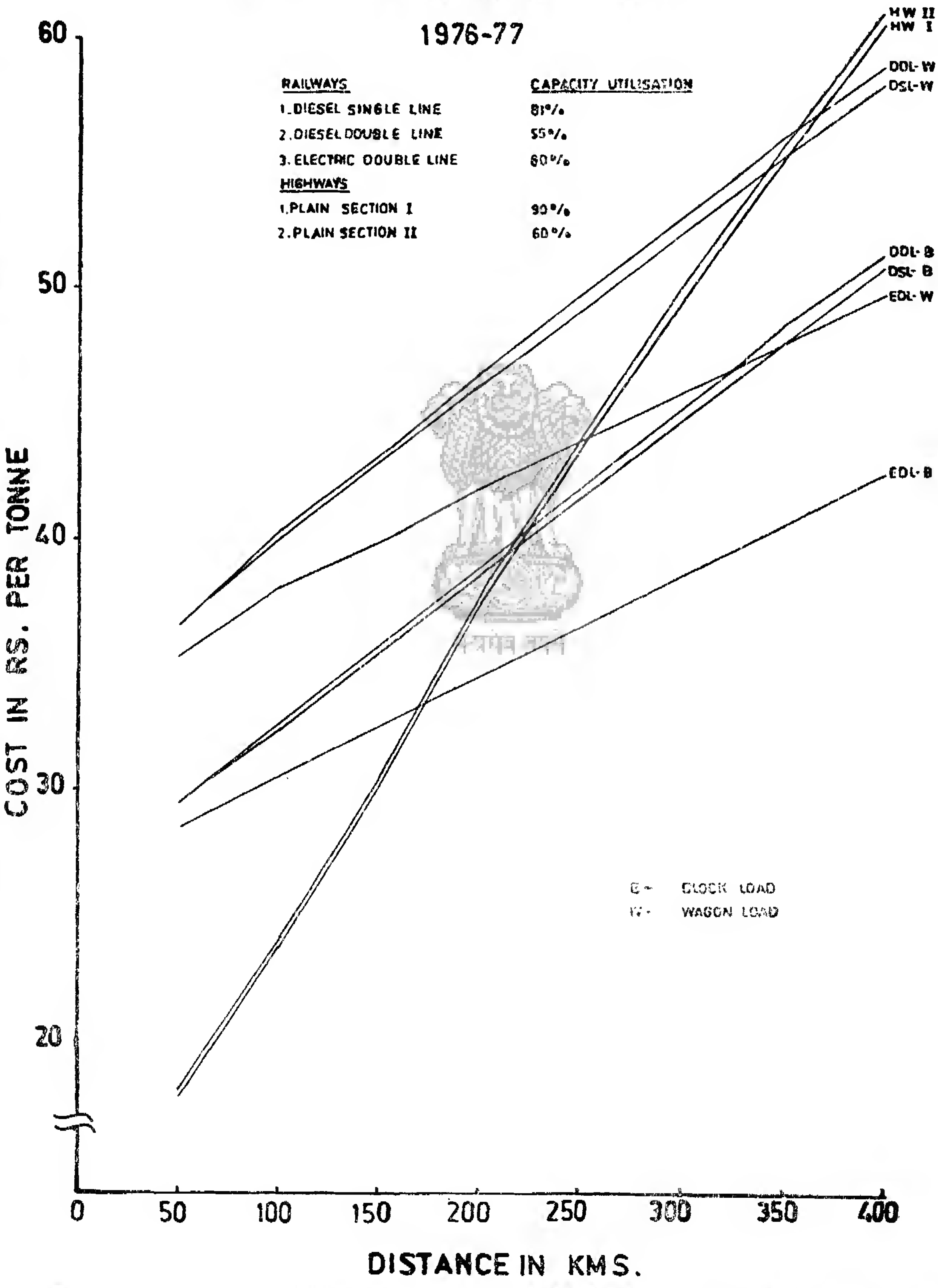


CHART 5

FERTILISER (UREA)
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77

RAILWAYS	CAPACITY UTILISATION
1 DIESEL SINGLE LINE	81 %
2 DIESEL DOUBLE LINE	55 %
3 ELECTRIC DOUBLE LINE	80 %
HIGHWAYS	
1 PLAIN SECTION I	90 %
2 PLAIN SECTION II	60 %

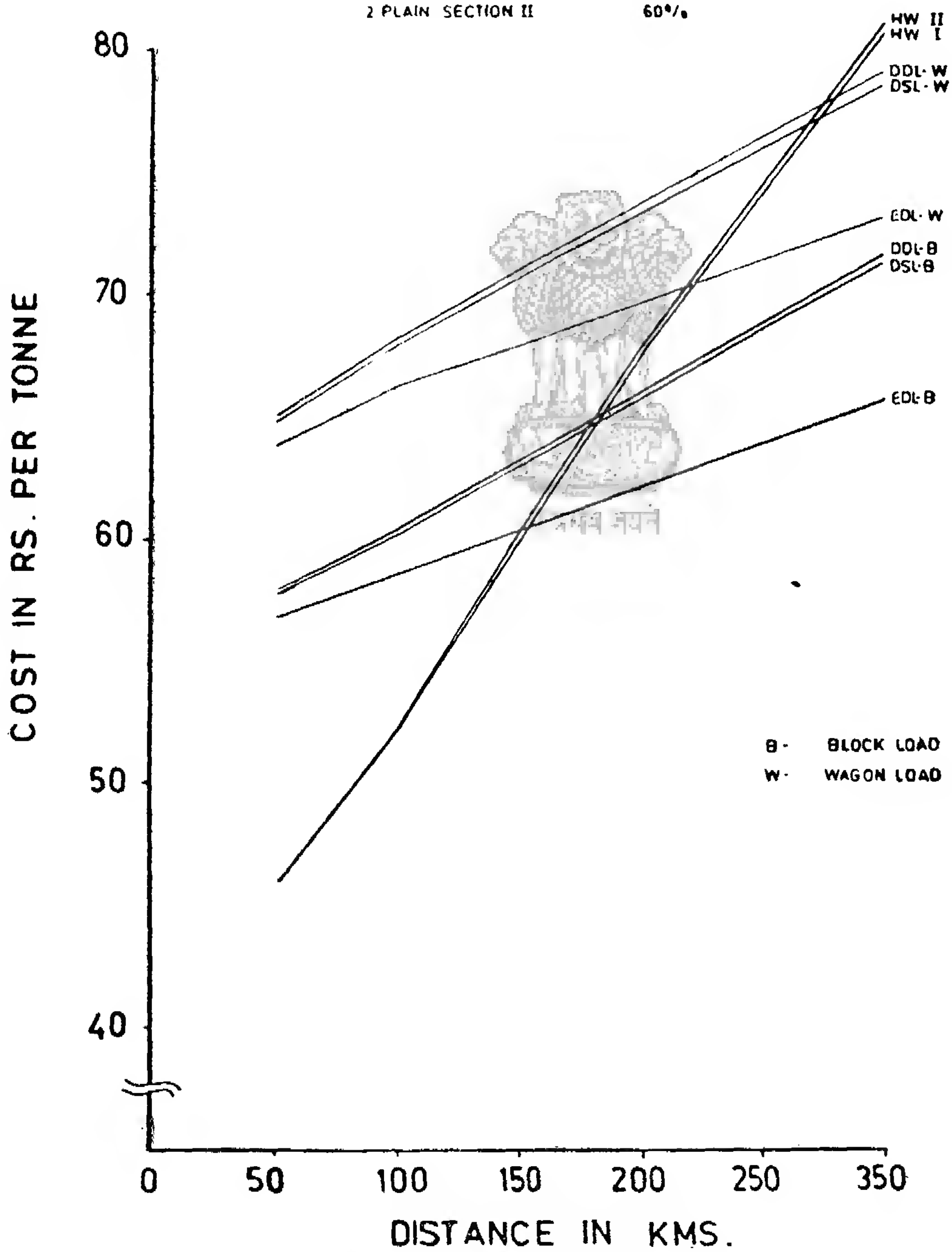
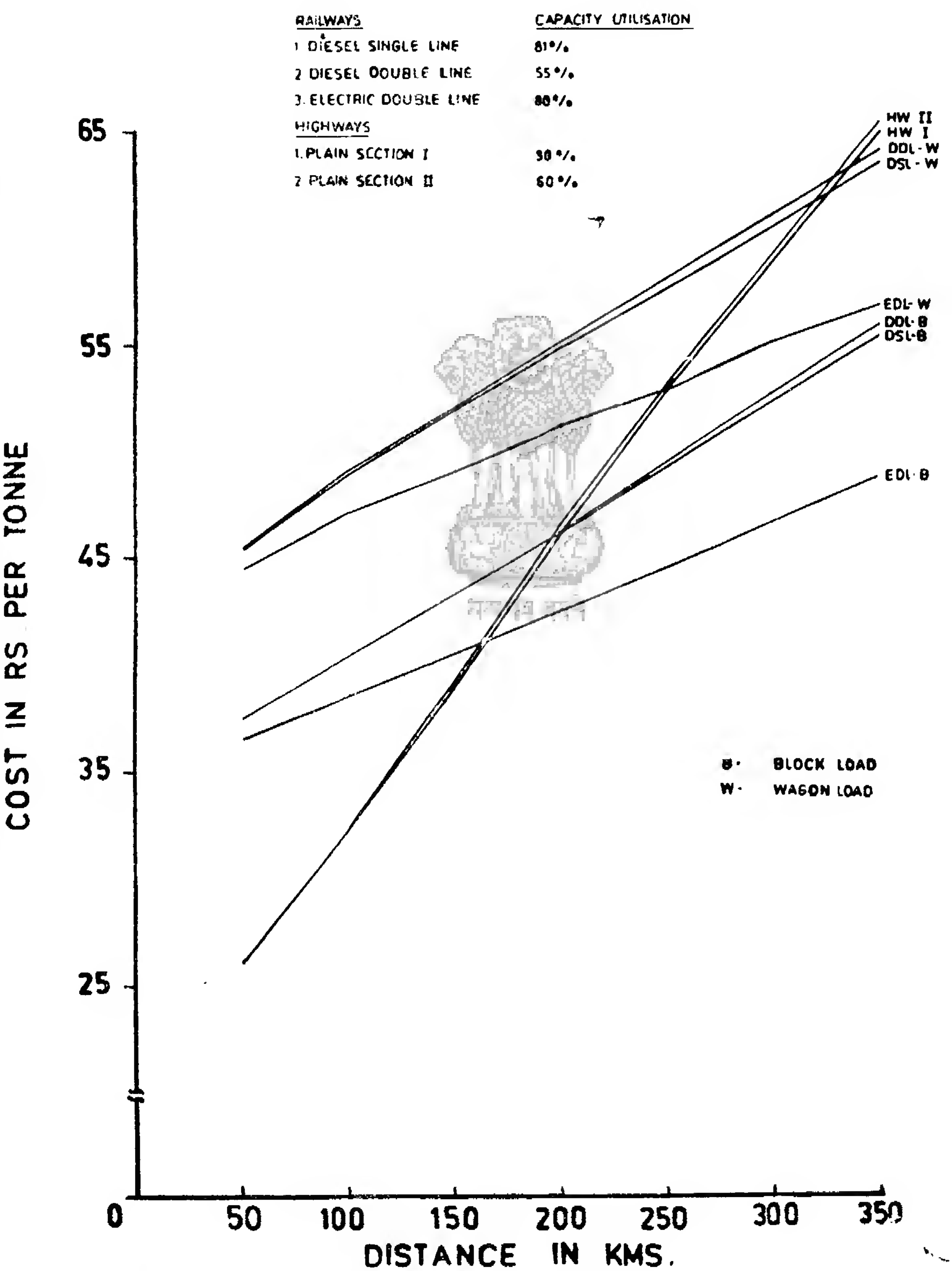


CHART 6

SUGAR
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77



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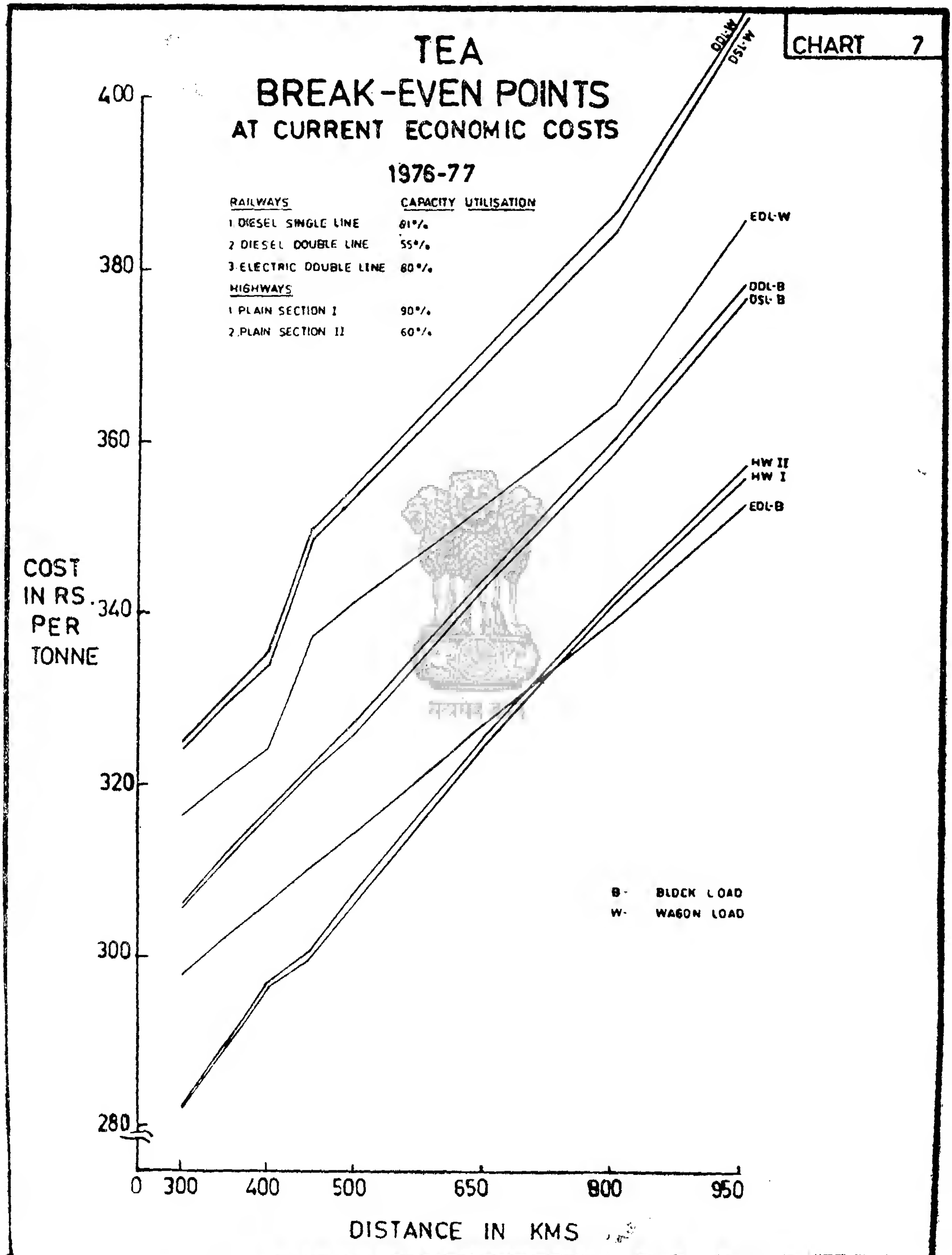


CHART 7
TEA
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77
RAILWAYS
CAPACITY UTILISATION
1 DIESEL SINGLE LINE 81%
2 DIESEL DOUBLE LINE 55%
3 ELECTRIC DOUBLE LINE 80%
HIGHWAYS
1 PLAIN SECTION I 90%
2 PLAIN SECTION II 60%
DDL-W
DSL-W
EDL-W
DDL-B
DSL-B
HW II
HW I
EDL-B
B - BLOCK LOAD
W - WAGON LOAD
COST IN RS. PER TONNE
400
380
360
340
320
300
280
0
300
400
500
650
800
950
DISTANCE IN KMS

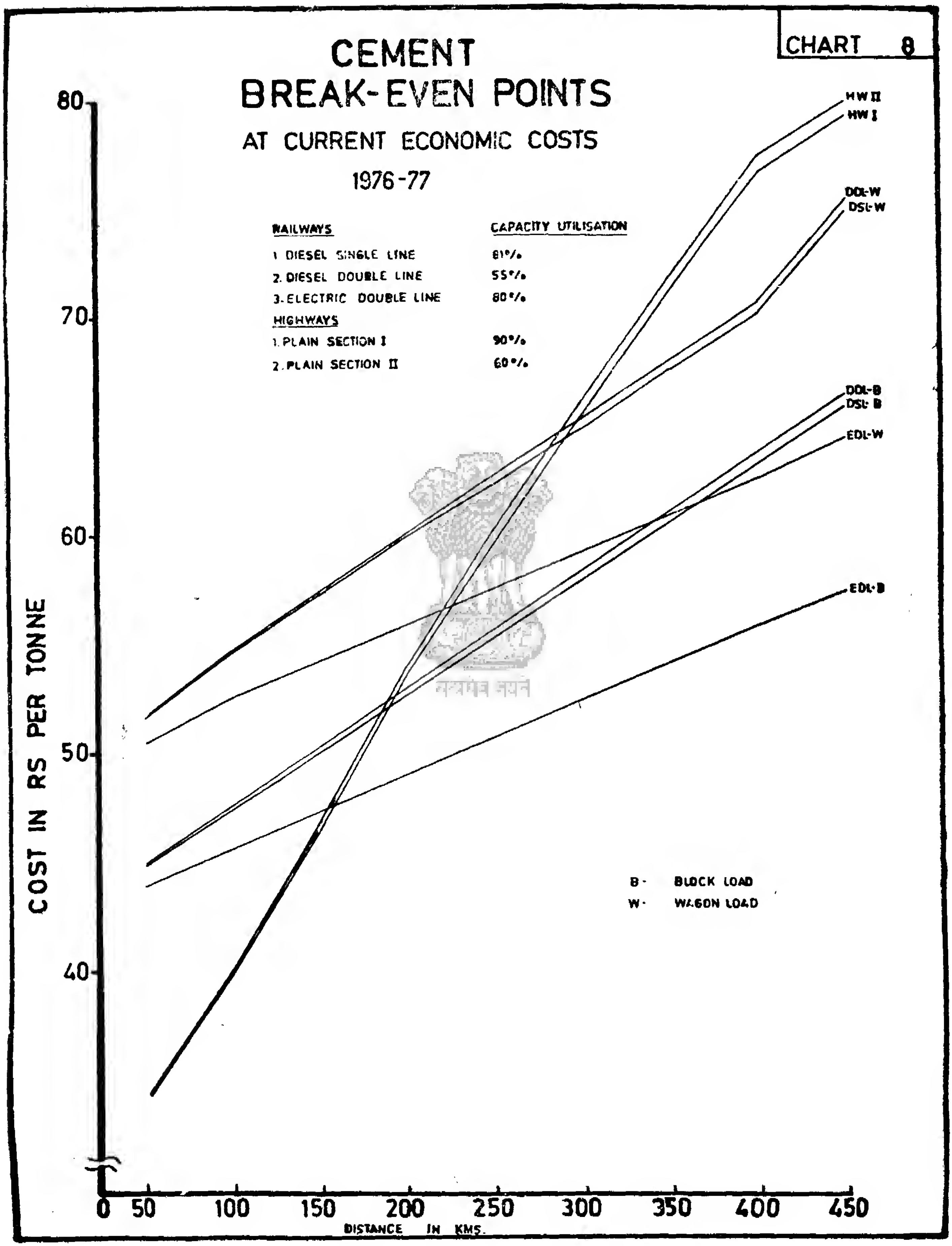


CHART 8
CEMENT
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77
RAILWAYS
CAPACITY UTILISATION
1. DIESEL SINGLE LINE 81%
2. DIESEL DOUBLE LINE 55%
3. ELECTRIC DOUBLE LINE 80%
HIGHWAYS
1. PLAIN SECTION I 90%
2. PLAIN SECTION II 60%
HW II
HW I
DDL-W
DSL-W
DDL-B
DSL-B
EDL-W
EDL-B
B - BLOCK LOAD
W - WAGON LOAD
COST IN RS PER TONNE
80
70
60
50
40
0 50 100 150 200 250 300 350 400 450
DISTANCE IN KMS.

3.101

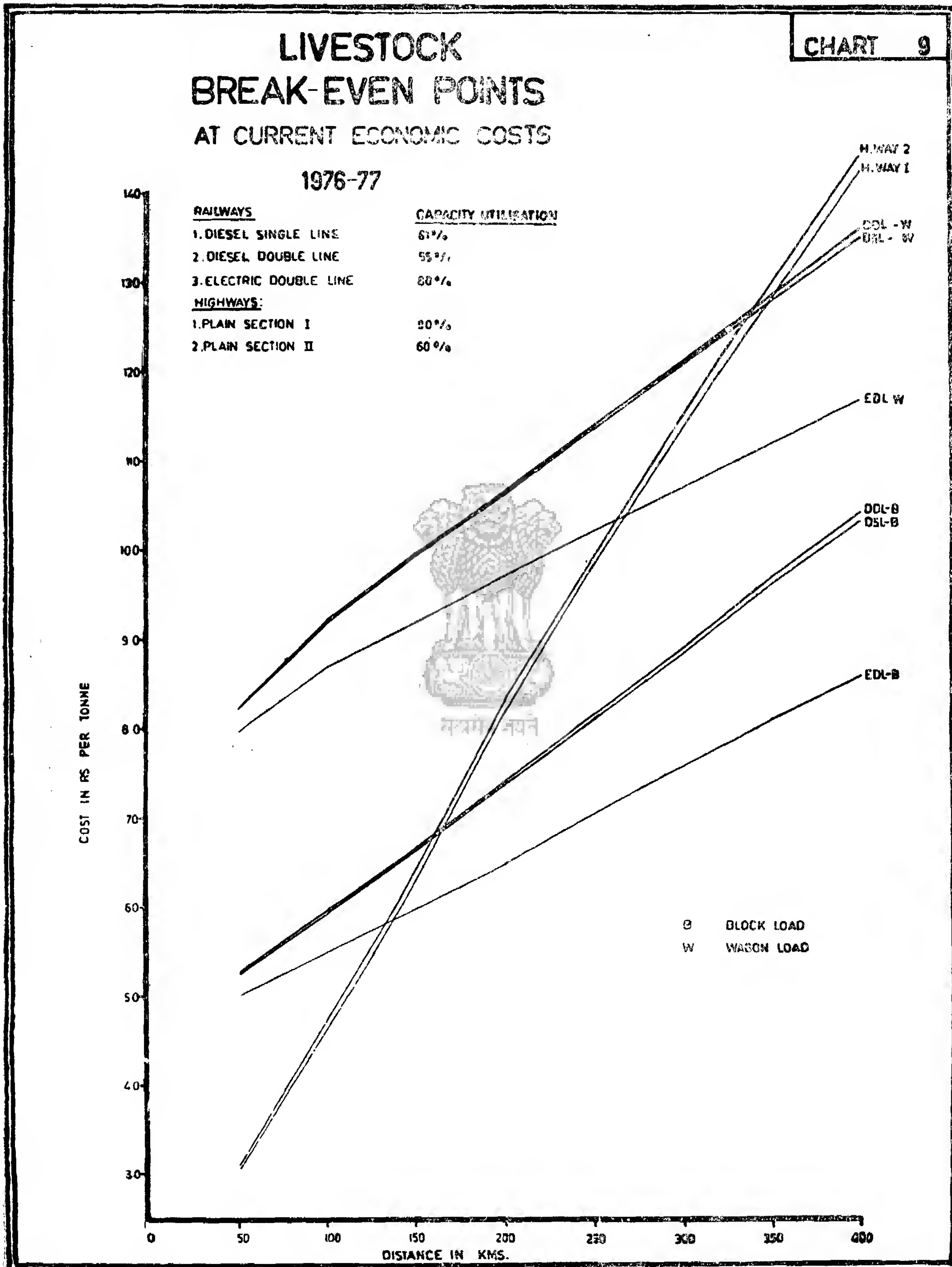


CHART 9
LIVESTOCK
BREAK-EVEN POINTS
AT CURRENT ECONOMIC COSTS
1976-77
RAILWAYS
CAPACITY UTILISATION
1. DIESEL SINGLE LINE 61%
2. DIESEL DOUBLE LINE 55%
3. ELECTRIC DOUBLE LINE 80%
HIGHWAYS:
1. PLAIN SECTION I 80%
2. PLAIN SECTION II 60%
H.WAY 2
H.WAY I
DDL-W
DSL-W
EDL W
DDL-B
DSL-B
EDL-B
B BLOCK LOAD
W WAGON LOAD
COST IN RS PER TONNE
DISTANCE IN KMS.
140
130
120
110
100
90
80
70
60
50
40
30
0
50
100
150
200
250
300
350
400

Annexure 3.3B

Unit Economic Cost for Passenger Traffic-Railways (1976-77) Passenger Train Services

(Rs. per passenger)

Description	Cost Item	Distance (Kms) 50	100	150	200	250	300	350	400	450	500
1	2	3	4	5	6	7	8	9	10	11	12
1. BROAD GAUGE— 100% Capacity Utilisation											
(a) Electric Traction											
Version I	User	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04
		(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)
	Operator	3.36	5.66	7.95	10.25	12.54	14.84	17.13	19.38	21.72	24.11
	Total	5.40	7.70	9.99	12.29	14.58	16.88	19.17	21.42	23.76	26.15
		(6.09)	(8.39)	(10.68)	(12.98)	(15.27)	(17.57)	(19.86)	(22.11)	(24.54)	(26.84)
Version II	User	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
		(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)
	Operator	3.36	5.66	7.95	10.25	12.54	14.84	17.13	19.38	21.72	24.11
	Total	6.12	8.42	10.71	13.01	15.30	17.60	19.89	22.14	24.48	26.87
		(6.28)	(8.58)	(10.87)	(13.17)	(15.46)	(17.76)	(20.05)	(22.30)	(24.64)	(27.03)
(b) Diesel Traction											
Version I	User	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04
		(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)
	Operator	3.47	5.88	8 29	10.69	13.10	15.51	17.91	20.32	22.73	25.13
	Total	5.51	7.92	10.33	12.73	15.14	17.55	19.95	22.36	24.77	27.17
		(6.20)	(8.61)	(11.02)	(13.42)	(15.83)	(18.24)	(20.64)	(23.05)	(25.46)	(27.86)
Version II	User	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
		(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)	(2.92)
	Operator	3.47	5.88	8.29	10.69	13.10	15.51	17.91	20.32	22.73	25.13
	Total	6.23	8.64	11.05	13.45	15.86	18.27	20.67	23.08	25.49	27.89
		(6.39)	(8.80)	(11.21)	(13.61)	(16.02)	(18.43)	(20.83)	(23.24)	(25.65)	(28.05)

N.B.—(i) Version I Movement between two mofussil towns.

(ii) Version II Movement between a metropolitan city and a mofussil town.

(iii) Figures in parentheses are calculated on the basis of average of user costs as obtained in the case of Railway and Highway passengers.

Annexure 3.4

Unit Economic Cost For Passenger Traffic Highways (1976-77)

(Paise per passenger)

Description	Cost Item	Distance (kms.)				
		50	100	150	200	250
1	2	3	4	5	6	7
Version I						
Section I	User	342.00 (273.00)	342.00 (273.00)	342.00 (273.00)	342.00 (273.00)	342.00 (273.00)
	Operatoı	144.81	322.14	425.45	525.27	638.85
	Total	486.81 (417.81)	664.14 (595.14)	767.45 (698.45)	867.27 (798.27)	980.85 (911.82)
Section II	User	342.00 (273.00)	342.00 (273.00)	342.00 (273.00)	342.00 (273.00)	342.00 (273.00)
	Operator	146.10	325.26	430.13	531.44	646.56
	Total	488.10 (419.10)	667.26 (598.26)	772.13 (703.13)	873.44 (803.44)	988.56 (919.56)
Version II						
Section I	User	308.00 (292.00)	308.00 (292.00)	308.00 (292.00)	308.00 (292.00)	308.00 (292.00)
	Operator	152.55	330.84	434.39	534.35	648,22
	Total	460.55 (444.55)	638.84 (622.84)	742.39 (726.39)	842.35 (826.35)	956.22 (940.22)
Section II	User	308.00 (292.00)	308.00 (292.00)	308.00 (292.00)	308.00 (292.00)	308.00 (292.00)
	Operator	153.84	333.96	439.06	540.53	655.94
	Total	461.84 (445.84)	641.96 (625.96)	747.06 (731.06)	848.53 (832.53)	963.94 (947.94)

N.B: i) Version—I : Movement between two mofussil towns.

ii) Version—II : Movement between a metropolitan city and a mofussil town.

iii) Figures in parentheses are calculated on the basis of average of user costs as obtained in the case of Railway and Highway passengers.

Annexure 3.5

Rail and Road Traffic and Economic Indicators

Year	Y_1	Y_2	Y_3	Y_4	Y_5	UP	TP	GDP	AG	IND	SER	Per capita income
1960-61	11.8	65.8	87.7	57.0	35.0	79.0	439.0	140.7	67.5	28.7	44.5	305.6
1961-62	13.3	68.6	91.2	59.0	40.0	81.0	448.0	146.1	68.1	31.0	47.0	309.2
1962-63	13.6	70.4	100.7	65.0	44.0	84.0	458.0	149.9	66.4	33.8	49.7	308.2
1963-64	14 5	74.1	106.8	69.0	47.5	87.0	468.0	158.0	68.1	36.9	53.0	318.3
1964-65	15.8	77.7	106.6	76.0	51.0	90.0	479.0	170.1	74.4	39.7	56.0	335.1
1965-66	17.2	79.1	116.9	95.0	55.0	92.0	489.00	162.7	63.8	41.0	57.9	311.0
1966-67	18.4	83.7	116.6	106.0	56.8	96.0	500.0	164.5	63.0	41.6	59.9	307.4
1967-68	19.0	88.2	118.9	124.0	59.0	99.0	512.0	177.9	72.8	43.0	62.1	325.4
1968-69	19.5	87.4	125.1	140.0	64.0	102.0	523.0	182.9	73.4	45.1	64.4	327.0
1969-70	22 2	91.2	128.0	156.0	65.0	105.0	535.0	194.6	78.1	49.0	67.5	340.6
1970-71	23.0	95 1	127.4	169.0	66.0	109.0	547.0	205.9	84.5	50.2	71.2	343.0
1971-72	24.2	101.1	133.2	190.0	66.0	112.0	559.0	298.2	82.8	50.8	74.6	349.0
1972-73	26.6	106.9	136.5	196.0	67.0	116.0	571.0	206.0	76.8	52.7	76.5	337.1
1973-74	28.0	107.6	122.4	208.0	67.0	120.0	583.0	216.5	83.7	53.7	79.1	349.1
1974.75	27.2	99.1	134.3	219.0	71.0	123.0	595.0	216.7	80.4	54.8	81.5	343.2
1975-76	32.9	115.9	148.3	225,0	73.0	127.0	606.0	221.1	84.6	56.0	80.5	365.9
1976-77	37.1	126.7	156.8	235.0	76.0	131 0	618.0	229.6	87.9	58.4	83.3	362.3

Y_1 : Intra-City Railway Passenger Traffic (b p. km.)
Y_2 : Inter-City Railway Passenger Traffic
Y_3 : Railway Freight traffic (b tkm)
Y_4 : Road passenger traffic (b pkm)
Y_5 : Road freight traffic (b tkm)
UP : Urban Population (m Rupees)
TP : Total Population (Millions)
GDP : Gross Domestic Product (m Rupees)
AG : Contribution of Agriculture Sector to GDP (b Rupees)
IND : Contribution of Industrial Sector to GDP (b Rupees)
SER : Contribution of Service Sector to GDP (b Rupees)

Annexure 3.6

Regression Equalisation Used in Section 3.5

$$\text{Log } Y_1 = -6.512 + 2.060 \text{ Log UP} \quad R^2 = .99$$
$$(-16.07) \quad (32.52)$$

$$\text{Log } Y_2 = -11.66 + 2.45 \text{ Log TP} \quad R^2 = 0.98$$
$$(-16.40) \quad (28.06)$$

$$\text{Log } Y_3 = -3.190 + 1.134 \text{ Log TP} \quad R^2 = 0.85$$
$$(-3.12) \quad (9.46)$$

$$\text{Log } Y_4 = -3540.70 + 588.306 \text{ Log TP} \quad R^2 = 0.99$$
$$(-31.79) \quad (33.06)$$

$$\text{Log } Y_5 = 1.932 + 0.856 \text{ Log IND} \quad R^2 = 0.97$$
$$(4.41) \quad (22.80)$$

Y_1 = Intra-city rail passenger traffic

Y_2 = Inter-city mail/express rail passenger traffic

Y_3 = Inter-city ordinary rail passenger traffic

Y_4 = Road passenger traffic

Y_5 = Total rail+road freight traffic

UP = Urban population

TP = Total population

IND = Contribution of industry and mineral sector to G. D. P.

Annexure 3.6 A

Correlation Matrix

	t	Y_1	Y_2	Y_3	Y_4	Y_5	UP	TP	GDP	Agr.	Ind.	Ser-vice	Per capi-ta income
t	1.0	0.99	0.98	0.95	0.98	0.95	0.999	0.999	0.98	0.85	0.98	0.92	0.90
Y_1		1.0	0.99	0.95	0.97	0.94	0.99	0.99	0.97	0.84	0.97	0.94	0.90
Y_2			1.0	0.95	0.96	0.93	0.98	0.98	0.97	0.84	0.96	0.93	0.90
Y_3				1.0	0.92	0.97	0.95	0.95	0.93	0.74	0.96	0.90	0.84
Y_4					1.0	0.95	0.98	0.98	0.98	0.86	0.96	0.87	0.88
Y_5						1.0	0.95	0.95	0.95	0.76	0.99	0.84	0.84
UP							1.0	0.999	0.99	0.85	0.98	0.91	0.90
TP								1.0	0.99	0.85	0.98	0.91	0.90
GDP									1.0	0.91	0.98	0.88	0.94
Agr.										1.0	0.81	0.79	0.96
Ind.											1.0	0.86	0.88
Service												1.0	0.88
Per capita Income													1.0

Notes : t = time

Y_1 = Intra-city rail passenger traffic (in b PKM)
Y_2 = Inter-city rail passenger traffic (in b PKM)
Y_3 = Rail freight traffic (in b TKM)
Y_4 = Road passenger traffic (in b PKM)
Y_5 = Road freight traffic (in b TKM)
UP = Urban population (in million)
TP = Total population (in million)
GDP. = Gross domestic product at 1960-61 prices
Agri = Agricultural gross product at 1960-61 prices
Ind. = Gross product for Industry & Minerals at 1960-61 prices
Service = GDP—(Agr.+Ind.)

Per Capita Income at 1960-61 prices

Correlations are taken for 17 years (1960-61 to 1976-77)

Annexure 3.7

Sector wise Production Targets (2000-01)* Used For Estimating Traffic by Gravity Model Method

Commodity	Production (in m. tonnes)	Commodity	Production (in m. tonnes)
1	2	3	4
Paddy	86.20	Other Minerals	86.18
Wheat	70.33	Sugar	21.81
Jawar	12.61	Hydrogenated Oil	2.40
Bajara	9.10	Jute Textiles	3.75
Other Cereals	19.88	Cotton Textiles	5.15
Pulses	30.19	Paper	3.21
Jute	4.01	Petroleum Products	78.70
Cotton	5.98	Chemicals	11.47
Coal	388.13	Fertilizers	26.90
Petroleum and Natural Gas.	163.92	Cement	79.74
Iron Ore	125.09	Iron and Steel	37.87

* Production targests for other years are given in 1978-83 revised plan documents.

Annexure 3.8

Base Year and Projected Traffic

(Originating traffic in million

Commodity	1977-78				1982-83	
	Originating	Average Lead Rail	Road	Total	Originating	Av. Lead
1	2	3	4	5	6	7
1. Paddy					12.92	875
2. Wheat					14.73	1015
3. Jowar	23.65	1278	277	959	5.80	945
4. Bajra					3.63	788
5. Other cereals					5.06	914
6. Pulses					5.57	796
7. Jute (Raw)	0.58	767	472	693	1.53	477
8. Cotton (Raw)	1.67	1417	477	668	1.36	574
9. Coal	69.26	691	408	669	96.53	673
10. Iron Ore	17.23	529	96	526	43.80	625
11. Other minerals	16.94	825	300	415	18.99	657
12. Sugar	5.20	1089	380	727	5.60	658
18 Hydrogenated oil	2.30	1314	396	636	2.58	731
14. Cotton Textiles	1.41	1479	505	566	1.20	694
15. Jute Textiles	0.73	1397	414	874	1.48	708
16. Paper & Newsprint	1.68	1223	366	848	1.35	710
17. Petroleum Products	17.85	656	230	542	20.47	646
18. Chemical & Drugs	3.52	1277	407	609	4.61	553
19. Fertilizers	11.21	1039	267	822	13.46	732
20. Cement	15.20	717	286	622	20.97	632
21. Iron & Steel	15.21	1101	371	840	15.00	756
22. Others	71.13	1260	410	607	103.52	625
Total	274.95	806	354	658	400.15	683
Traffic (Billion Tkm)		180.92			273.19	
T. Production (mn. tonnes)		—			522.06	
Transport Co-efficient		—			56.83	

Annexure 3.8

For Major Commodities

tonnes & average lead in Kilometres)

1987-88		1992-93		2000-01	
Origi-nating	Av. Lead	Origi-nating	Av. Lead	Origi-nating	Av. Lead
8	9	10	11	12	13
14.83	889	18.45	925	20.15	908
18.02	1067	22.99	1112	28.72	1099
5.77	989	6.81	1037	5.77	1029
3.83	821	4.74	856	4.64	844
6.30	958	7.87	918	9.53	989
6.45	838	8.45	872	10.94	867
1.65	404	2.59	420	4.01	418
1.89	597	2.81	624	5.98	618
128.11	689	189.04	657	268.30	879
50.06	653	58.65	706	76.91	707
15.35	690	19.65	726	45.72	694
7.92	688	14.72	724	21.81	710
3.36	777	4.58	718	7.29	822
1.69	726	2.42	812	5.15	755
1.61	736	2.45	756	3.75	768
1.79	731	2.06	773	3.21	748
30.56	674	32.36	755	48.80	704
4.59	559	6.81	713	11.47	575
16.56	766	15.88	582	26.54	787
23.24	699	30.41	798	40.50	738
18.97	794	21.53	745	49.23	809
126.52	650	160.33	649	243.73	637
489.06	709	654.54	716	942.16	706
346.95		468.38		665.10	
638.71		783.10		1141.41	
56.78		61.96		61.19	

Annexurs 3.9

Commodity Flows of Inter Regional Freight Traffic and Inter Modal Shares 1978-79

Commodity	Traffic (million)		Break-even distance (kms)			Percentage share of			
	Tonnes	Tkms	76-77 prices of diesel (Assumption II)	1979 prices of diesel (Assumption III)	50 per cent increase in 79 prices (Assumption IV)	Observed		Assumption II	
						Rail	Road	Rail	Road
1	2	3	4	5	6	7	8	9	10
1. Coal	69.3	46332	201	142	106	92.2	7.8	98.1	1.9
2. Foodgrains	23.7	22681	247	171	130	59.3	40.7	74.4	25.6
3. Iron Ore	17.2	9052	201	142	106	99.3	0.7	99.3	0.7
4. Mineral Oil	17.9	9676	230	161	121	73.2	26.7	67.4	32.6
5. Cement	15.4	9452	222	154	116	77.9	22.1	75.0	25.0
6. Lime Stone & Dolomite	6.9	2516	201	142	106	92.4	7.6	60.0	40.0
7. Irion & Steel	15.2	12778	311	175	128	64.3	35.7	65.4	34.6
8. Fertilizers	11.6	9213	200	141	107	71.9	28.1	82.6	17.4
9. Fruits and Vegetables	7.9	4206	467	223	162	8.9	91.1	37.1	62.9
10. Building Materials	7.9	1909	435	252	191	13.1	86.9	12.9	87.1
11. Stones and Marbles	6.7	1940	201	142	106	49.4	50.6	62.7	37.3
12. Wood & Timber	6.6	3723	311	175	128	38.6	61.4	56.6	43.4
13. Provisions & Households	6.9	3826	435	252	191	8.3	91.7	41.1	58.9
14. Others	61.8	43465	344	236	177	52.3	47.7	58.0	42.0
Total	275.0	180769	269	178	146	66.9	33.1	72.9	27.1

Annexure 3.9

Commodity Flows of Inter Regional Freight Traffic and Inter Modal Shares 1978-79

Traffice between Rail & Road—Tonnes				Percentage share of traffic between Rail and Road—Tkm.							
Assumption III		Assumption IV		Observed		Assumption II		Assumption III		Assumption IV	
Rail	Road	Rail	Road	Rail	Raod	Rail	Road	Rail	Road	Rail	Road
11	12	13	14	15	16	17	18	19	20	21	22
98.7	1.3	99.3	0.7	95.3	4.7	99.7	0.3	99.8	0.2	99.9	0.1
83.2	16.8	88.1	11.9	90.8	9.2	96.5	3.5	98.3	1.7	99.0	1.0
99.3	0.7	99.3	0.7	99.9	0.1	99.9	0.1	99.9	0.1	99.9	0.1
81.5	18.5	87.1	12.9	88.7	11.3	91.7	8.3	97.1	2.9	98.5	1.5
85.7	14.3	90.2	9.8	89.9	10.1	94.4	5.6	98.0	2.0	99.0	1.0
76.4	23.6	81.6	18.4	94.4	5.6	98.1	11.9	95.3	4.7	97.0	3.0
86.6	13.4	89.7	10.3	84.2	15.8	92.1	7.9	98.7	1.3	99.2	0.8
80.7	9.3	94.2	5.8	90.9	9.1	97.5	2.5	99.0	1.0	99.6	0.4
68.0	32.0	77.8	22.2	26.0	74.0	73.7	26.3	92.7	7.3	96.2	3.8
17.7	82.3	35.0	65.0	40.4	59.6	51.2	48.8	61.8	38.2	77.8	22.2
71.3	28.7	85.5	14.5	63.6	36.4	86.1	13.9	91.2	8.8	97.1	2.9
73.9	26.1	82.5	17.5	66.2	33.8	88.7	11.3	95.7	4.3	98.0	2.0
61.7	38.3	68.4	31.6	21.3	78.7	78.6	21.4	91.4	8.6	94.1	5.9
73.5	26.5	79.5	20.5	69.0	31.0	89.0	10.8	95.4	4.6	97.5	2.5
82.9	17.1	87.4	12.6	82.2	17.8	93.3	6.7	97.2	2.8	98.5	1.5

Chapter 4

Taxation, Pricing And Subsidy

4.1 General Pricing and Taxation Framework

4.1.1 It is generally assumed that taxation in transport has three distinct functions (a) as a user price in lieu of service provided, (b) as part of general revenue collection and (c) as a shadow price for a scarce resource used in transport sector. Traditionally, Government has looked upon transport taxes as part of general taxation particularly excise duties and sales tax on petroleum products have always been treated as commodity-taxation for mobilisation of general revenue, not as a quid pro quo payment for highway service. This being so, the question whether road users as a class pay more or less through taxation than the expenditure incurred by Government in providing highway service is merely of academic interest, at least from a policy angle. This issue was, however, examined at length by the Working Group on Transport Pricing, Taxation and Subsidy set up by us and its findings are summarised in annexure 4.1. The two crucial aspects of transport taxation and pricing which, in our view, have to be emphasised are their functions as a means of internal generation of resources and promotion of efficiency in transport sector.

Generation of Internal Resources

4.1.2 Considering the magnitude of investment required for future transport development and severe resource constraint, it may not be feasible to provide funds on the scale we have visualised in this report, unless each transport agency is in a position to generate sufficient internal resources for its own development. The magnitude of resources so generated will obviously depend upon the extent of mark-up in determination of fare and freight rates over the short-run marginal costs of providing transport service. The higher the mark-up, the larger the contribution of a particular transport agency towards internal resource generation. In our view, the two principal considerations involved in determination of the mark-up above short-run operating costs of transport services are elasticity of demand for the service and equity or income distributional effects of pricing and taxation between various groups of transport users. For example, the more inelastic the demand, the greater is the opportunity to Government for mobilising resources by charging higher mark-ups above short-run costs. However, in trying to impose higher taxation for a particular transport service, Government should ensure that services which, by and large, serve lower income or socially vulnerable groups of population, which have no other means of transport, are not affected adversely. We believe that, in line with these general considerations, taxation and pricing policies followed should be such as are conducive to maximum generation of internal resources, if investment in transport sector is to be financed on the scale we have recommended.

Need to cover Opportunity Cost of Capital

4.1.3 There are two corollaries which immediately follow the foregoing premises. No transport service should be run if it cannot cover at least its short-run marginal costs, unless there are special social grounds for retaining it. While there may be no objection to cross-subsidisation to a limited extent in the transport sector (for example particular segments of railway system may be subsidized from earnings made on other segments) we do not visualize in our scheme of things any need for a general subsidy for transport. In our view, no large-scale investments, in general in such transport projects should be undertaken as are not economically viable on a long-term basis. The economic viability of a project must be assessed by taking into account all its costs and benefits. The second corollary is that in a planned economy where inter se investment priorities are determined on larger socio-economic considerations, no

meaningful purpose can be served by relating revenue from each transport service to expenditure incurred on it by Government. What this implies is that, while no service must be allowed to operate at a loss and, therefore, subsidised, surpluses generated by it, if any, need not accrue to its own account separately but to national pool of investible resources. It is then for Government to determine on larger considerations what proportion of such surpluses are invested in capacity expansion programme of a particular undertaking and in creation of other social overhead facilities.

4.1.4 We find no force in the argument that taxes earned from road users be related to expenditure incurred by Government on road system, for any excess or shortfall is in our view an indication of Government's taxation policy which takes into account a number of other considerations. We feel that the single most important reform worth advocating in road taxation is need for uniformity, rationalisation and simplification of taxes, so that there is maximum economy and efficiency in collection.

Role of taxes as Shadow Price for Scarce Resources

4.1.5 There is also the role of taxes as shadow prices for use of scarce resources. The most important scarce resource used in transport are petroleum products, the c.i.f. price of which is rising steeply and continuously. We believe that fuel taxation in future should not only serve as a means of raising revenue for Government but also for ensuring socially efficient use of this scarce resource.

4.1.6 The pricing principles we have recommended point to the need for revamping railway fare and freight structure. This question is being examined independently by the Rail Tariff Enquiry Committee and, therefore, we will not go into details here except make some observations on policies to be adopted.

4.1.7 During the first three Plan periods, funds allocated to transport sector were around one fourth of total outlay in public sector, the railway development programme constituting 11 to 16 per cent of it. In the Fourth, Fifth and Sixth plans, outlay on railways formed only 5 to 6 per cent of total public sector outlay. In absolute terms, railway outlay was Rs. 934 crores in the Fourth Plan, Rs. 2202 crores in the Fifth Plan, and Rs. 3400 crores in the 1978-83 Plan.

4.1.8 The rail system contributed about 40 per cent of total development plan outlay from out of its internal resources, the main source being contribution to depreciation reserve fund. Resources from railway are conventionally treated as a source of finance for the total Plan, not for financing the railways' own development plan directly. We support this principle as it shows that if Government were to attach priority to railway development, it will not allow deceleration of rail development in the absence of inadequacy of internal generation of resources. But while, in our view, financing of rail expansion programmes from the national exchequer is justifiable if railways are given priority in national transport system, we do not see any logic in running a railway service at a loss unless there are compelling social grounds for it.

4.2 Railway Pricing Policy

4.2.1. The structure of fares, rates and other charges for traffic carried by passenger or goods trains in all its aspects is being examined by the Rail Traffic Enquiry Committee, which has submitted an interim report dealing with some of these aspects. Our observations are in keeping with the recommendations made by that Committee.

4.2.2. There is need for revision of railway freight and fare structure for two reasons. First, railways should bring tariff structure in line with costs to conform to the general pricing principle. Secondly, the existing tariff structure suffers from anomalies and entails undesirable subsidies which need to be corrected if development and proper maintenance of the railway system are not to be jeopardised. Some of these anomalies have been rectified in the interim report of the Tariff Enquiry Committee, particularly in tariff rates for suburban passenger traffic and subsidisation of items of goods traffic. Nevertheless, there are still a number of distortions in tariff structure which require further rationalisation.

Fares Policy

4.2.3. On suburban railway systems of Bombay, Calcutta and Madras, railways have been incurring increasing losses on account of concessional monthly season tickets. In 1976-77 losses incurred by railways on this traffic amounted to Rs. 24.9 crores. With fare increase from 1 April 1979, following the interim report of the Rail Tariff Enquiry Committee, losses are likely to be reduced by Rs. 15 crores. This will still leave the railways with losses of Rs. 10 crores a year on traffic level of 1976-77. A good case therefore, exists for a further upward revision of suburban season ticket fares. The proposed upward revision of fares would help railways cater to increasing demand for traffic in metropolitan cities.

4.2.4 By and large long-distance passenger traffic covers its costs. For long-distance journeys, railways operate mail and express services, with a gradation in fare structure, which varies with the quality of service. Apart from mail and express services, railways also run stopping passenger trains for short-distance travel. These services mainly provide for second class travel, and tariffs for them are lower than for mail and express services. Stopping passenger services are, however, a losing proposition for railways, and this is, therefore, another area of distortion which needs to be examined.

Freight Rates Policy

4.2.5 For carriage of certain commodities of mass consumption like foodgrains, pulses, salt for edible use, edible oils, gur, jaggery and oilseeds, railways charge lower freight rates than for other commodities as part of their social obligation. The railways incurred losses on this traffic amounting to Rs. 49 crores in 1976-77 and Rs. 41 crores in 1977-78. About 50 per cent of these losses were on account of foodgrains alone. The purpose of this subsidisation is to provide essential commodities of mass consumption at reasonable prices. The Working Group on Transport Pricing, Taxation and Subsidy, which examined this, however, saw little justification in it. The Group studied the impact of transport costs on delivery prices of foodgrains and salt. For foodgrains it found that if the entire loss of Rs. 22.43 crores in 1976-77 was to be recovered, the delivery price would go up by no more than 1.1 paise per kg., which would hardly be a burden to the consumer. It, however, emphasized that similar studies should be made for other commodities before a firm conclusion is drawn. The open-ended question is to what extent cost-plus basis of fixing rail freight rates for items of mass consumption will lead to rise in their prices. The evidence we have at present in connection with freight equalisation* suggests that factors other than transport costs are far more influential in determining prices paid by consumers. If freight rates on articles of mass consumption are brought in line with costs, it would not cause much hardship to the community. The Rail Tariff Enquiry Committee may examine this question in greater detail.

4.2.6 There is an exception to this rule. The location of the north eastern region, now linked with the rest of the country through a longer rail route, should not put people in that area to a disadvantage on account of moving essential commodities at high cost to it and, therefore, a suitable freight policy needs to be devised for this region.

4.3 Airlines Pricing

4.3.1 Aviation costs have two main components, namely, airline operating and infrastructure costs. Fares charged by Indian Airlines have by and large covered operational costs and more recently have generated surpluses for expansion. Since 1974, Indian Airlines has not received any capital assistance from Government. However, some points merit consideration in regard to air fare policy.

4.3.2 First, although Indian Airlines is at present covering operating costs and generating surpluses, it does not enjoy the freedom and flexibility for suitably revising and adjusting fare structure to meet costs and generate maximum

*See Chapter 5

internal resources. This point has been emphasised in our Report on "Short Haul Air Services" (March 1979). Secondly, Indian Airlines should fix fares, keeping in view the viability of the system as a whole. This means that the Airlines is perfectly justified in cross-subsidizing losing services within the limits permissible under the systems approach. For example, in the last five years, only 30 per cent of services have been making a profit while 70 per cent are running at a loss. In general, short haul services and subsidized. Finally, if Indian Airlines is directed by Government to operate a service which in its judgement is not commercially viable in the long run but is still needed on social and administrative grounds, we recommend payment of direct exchequer subsidy for operating it.*

4.4 Road Transport Taxation

4.4.1 Taxes raised from motor vehicle owners and other road users are levied in various forms and at several levels by Central, State and local authorities. The Central taxes relate to customs and excise duties on motor vehicles, motor parts, fuels and lubricants. Sales tax is levied by States on these items, which also levy taxes on motor vehicles, carriage of passengers and goods, fees for vehicle registration, driving licence, conductors' licence etc. Local authorities levy octroi and terminal taxes on goods, animals and passengers entering a local area.

Level of Taxation

4.4.2 Representations have been made to us regarding road taxation, stressing that the overall burden is very heavy and inequitous, and that it adversely affects growth and profitability of road transport industry. We have considered all this carefully and have tried to obtain data on whether operation of road transport industry is causing loss to owners. We were unable to find any evidence to support this view. In fact, the scanty data we could obtain from tax authorities indicated a high profitability (around 30 per cent on an average) in road transport industry. A large number of applications are received for road permits and hardly any owners have gone into liquidation. Further, it continues to be a popular form of investment for a small investor. These facts indicate that the present tax structure has no adverse effect on road transport industry.

4.4.3 Attention is often drawn to the extraordinarily high rate of customs and excise duties and sales tax on fuel. But data presented in table 4.1 show that despite these taxes, diesel consumption, which is the principal fuel used in road transport, has not declined. In fact it has recorded a steady growth.

Table 4.1

Consumption of HSD in Transport Sector

(In Thousand Tonnes)

Year	Road Transport (E)	Railways	Tractors (E)	Total** (E)
1	2	3	4	5
1973-74	4,969	500	414	5,942
1974-75	5,073	525	453	6,111
1975-76	5,154	550	497	6,263
1976-77E	5,267	690	543	6,565
1977-78E	5,415	740	591	6,813

4.4.4 Whether a particular tax is inequitous, excessive, or crippling for any particular industry or its incidence falls heavily on particular groups of society is a matter for tax authorities to determine.

*See our specific recommendations concerning the north eastern region in the Report on "Short Haul Air Services".

E : Estimated.

** : Includes consumption of HSD by IWT, coastal shipping and international bunkers.

We have no reliable data or analysis to be able to make any value judgement. Nor can we support the contention that total tax raised from any particular source or body of consumers should be spent on that source or on those taxpayers. This will hit basic principles of public finance. Only for licence fees and motor vehicle taxes is an attempt made to see whether they meet costs of highway services on a quid pro quo basis. To see whether such a relationship is borne out in India, table 4.2 excludes customs and excise duties and sales tax on fuel and shows the relationship between relevant road revenues and public expenditure on road system. Actually, taxes paid by road users as a whole bear a close relationship to public expenditure on road construction and maintenance.

Table 4.2

Revenue From Road Transport and Expenditure on Roads

(Rs. Crore)

Year	Total revenue* from road transport	Revenue from road transport other than import and excise duties on motor fuel and HSD and sales tax on motor fuel/HSD	Expenditure on roads**
1	2	3	4
1960-61	166.93	77.87	109.76
1965-66	399.06	177.96	179.66
1970-71	683.17	266.32	257.60
1975-76	1412.71	642.22	638.80

Source : Ministry of shipping and Transport (DTR).

* : Relates to (i) import and excise duties levied by the Centre on motor vehicles and accessories, tyres and tubes, motor-fuel and HSD, and (ii) motor vehicle taxes and fees, sales tax on motor fuel and taxes on passengers and goods levied by the States.

** : Includes development and maintenance expenditure on roads by Centre and States.

4.4.5 There are some aspects of road taxation which lead to corruption, evasion and other malpractices. These distortions and malpractices result mainly from multiplicity of taxes and wide disparity in rates between different States. There are also differences in the method of assessment and collection. It is necessary that attempts be made to reduce multiplicity of these taxes and simplify assessment and collection methods.

Multiplicity of Taxes and Wide Disparity in Tax Rates

4.4.6 The main motor vehicle taxes levied by State Governments are (i) motor vehicle tax (also known as token tax or road tax), (ii) goods tax on public carriers, (iii) passenger tax on stage or contract carriages, (iv) permit fees for national, zonal or temporary permits (payable to States other than the State of origin), (v) wheel tax, and (vi) a variety of small fees.

Motor Vehicles Tax

4.4.7 Rates prescribed by States for different types of commercial vehicles vary, widely, depending on weight specifications of goods carriers (separately for public and private carriers) and permitted capacity for passenger vehicles. This can be seen from table 4.3 in which rates of motor vehicle tax for comparable goods and passenger vehicles have been shown separately for a few States for which data were readily available.

Table 4.3

Motor Vehicle Tax Rates in Different States (1975-76)

(Rs.)

State/Union Territory	Motor vehicle Tax per annum: Goods vehicles	Passenger vehicles
1	2	3
Kerala*	5,000	15,360
Maharashtra	4,130	3,300

* : Goods tax and passenger tax in Kerala merged with motor vehicles tax from 1.10.1975.

1	2	3
Goa	2,790	1,715
Rajasthan	2,670	2,750
Chandigarh	1,000	3,000
West Bengal	3,745	2,940
Tamil Nadu*	5,000	32,160

Source : Indirect Taxation Enquiry Committee, 1978, Part II, Page 611.

* : Tamil Nadu has no goods tax and the Passenger tax is merged with motor vehicles tax.

The wide differences in the incidence of motor vehicles tax in respect of passenger and goods vehicles as between different States are partly because of difference in rates as well as bases for calculating them. This can be seen from annexure 4.2. In our view, it would be desirable for State Governments to rationalise tax structure so that incidence of taxation at least among neighbouring States is made broadly comparable. This can be done by ensuring that basic rates are uniform as between States.

Passenger and Goods Taxes

4.4.8 For goods and passenger taxes the position varies widely. Goods tax is not levied in Tamil Nadu, West Bengal and Sikkim. The quantum of goods tax in States where it is levied is either a percentage of freight or a lump sum amount, and it is either collected separately or compounded with motor vehicles tax. The existing wide disparities encourage operators to register commercial vehicles in the States where tax is either lower or non-existent to the detriment of other States. Similarly, for passenger taxes, the tax rate differs in States. In some States, it is a per cent of and in others a fixed charge on fare. Again, it is either collected separately or along with motor vehicles tax. The rate of passenger tax varies from 10 to 35 per cent of fare in States where it is levied separately and not compounded with motor vehicles tax. Generally, this tax is collected on vehicle basis. Both State transport undertakings and private operators have complained that they have to spend considerable time and effort in satisfying the authorities about revenues collected from fares for calculating their liability for passenger tax. In view of these complaints, we suggest that in those States where goods and passenger taxes are levied separately, these should be consolidated with motor vehicles tax and collected as a lump sum on an annual, quarterly or even monthly basis as in southern States. Such a step would not only improve tax collection but also reduce inconvenience to operators. Goods and passenger taxes levied by the railways are collected on a consolidated basis and shared with State Governments. We recommend a single agency in each State for collection of motor vehicles and passenger and goods taxes as in Uttar Pradesh and Kerala.

Permit Fees

4.4.9 The permit fees vary widely in accordance with the nature of the permit and the State where it is issued. There is the composite fee of Rs. 700 per annum for public carriers under the national and zonal permit schemes for States other than the home State for which these permits are applicable, in addition to full taxes for the home State. The permit fee for intra-State permits and inter-State permits (other than zonal permits) issued under reciprocal agreements also varies in different States. The fee charged for a temporary permit which is issued up to a period of four months, is much higher than for a regular permit ; this also differs from State to State.

4.4.10 It has been represented to us that the composite fee of Rs. 700 per annum (which is lower than the counter-signature fee and goods tax) for national and zonal permits for States other than the home State for which such permits are applicable, cuts into the revenues of States where motor vehicles tax (and, therefore, counter-signature fee) as well as goods tax is higher. There have been other objections also to the increase in the number of zonal and national permits. We have considered the matter carefully. We fully support the national and zonal permit schemes in the

interest of freer flow of inter-State goods traffic. While the number of these permits need not be restricted, we recommend that such permits should be issued by charging full taxes applicable to each State for which they are issued, provided the taxes are collected at a single point in the home State. This would be on the pattern of the "free zone" introduced by some north Indian States. We will deal with the permit system in road transport in greater detail in Chapter 11.

Small Fees

4.4.11. There are a number of Small fees, trans port operators are required to pay, such as conductors, and drivers' licence fee, and fee for transfer of ownership or replacement of motor vehicles covered by stage or public carrier permits. The number of such fees in Maharashtra, for example, is as large as 19. The prevalence of a large number of small fees causes considerable inconvenience to operators. In our judgement, some of these fees can be easily eliminated without any deterioration in administration of road transport system or reduction in revenue. The procedure of collection also needs to be simplified. For example, fees charged for issue of a conductor's licence (Rs. 5.50 in Maharashtra) and for his badge (Rs. 3.50) could easily be combined into a single fee.

Single-Point Taxation

4.4.12 We understand that State Governments have agreed in principle to a proposal for introducing single-point taxation for motor vehicles operating on regular permits on inter-State routes. Regular permits are at present issued on a limited scale because of delay in finalizing reciprocal agreements between the States. Consequently, the greater part of inter-State traffic is undertaken on temporary permits, renewed for further periods, except in three States, namely, West Bengal, Orissa and Bihar, which also have accepted the principle of single-point taxation even in respect of temporary permits issued under arrangements with neighbouring States. When vehicles operate on inter-State routes on temporary permits, motor vehicle and other taxes have to be paid in the State of origin as well as in the States falling along the route. This leads to avoidable complications besides imposing undue financial burden, as fees charged for temporary permits are higher than for regular ones. To facilitate inter-state movement of traffic by road transport, it is necessary to bring about a degree of uniformity in taxation on inter-State routes. As road taxation is a State subject, the Centre, in our view, should assume responsibility to enact legislation as in the regulation of sales tax on inter-State sales. This will require an appropriate amendment to the Constitution, but it will be a step in the right direction if inter-State movement by road is to be promoted on efficient lines.

Case for Raising Excise Duty on Diesel

4.4.13 One of the scarce resources for road transport is petroleum products and to us there appears to be a need for adjusting the price of diesel to reflect its true cost to the economy. At present, while petrol is priced* at Rs.4.41 per litre, diesel is sold at Rs. 1.58 per litre although its c.i.f. price is higher. This leads to an anomaly where vehicles using petrol cross-subsidize those using diesel.

Fares Policy for State Road Transport Undertakings

4.4.14 Many State transport undertakings are presently operating at a loss, mainly on account of uneconomic fares,** which have been kept low as a deliberate policy of Government. Such low fares are not in conformity with the principle of covering short-term marginal costs. We. therefore, strongly recommend that fare structure of State transport undertakings should be revised and brought in line with cost structure. We also urge that within the broad policy frame, which may be laid down by the proposed National Transport Commission, each public sector undertaking should have the freedom and flexibility to revise and adjust its fare structure.

4.4.15 There may, however, be some exceptions to general policy guidelines we have suggest-

* Retail prices at Delhi.

** See Chapter 11.

ed for State transport undertakings. For example, transport undertakings operating in hilly or backward areas, such as the north eastern region, may not be in a position to cover short-run costs through fares partly because of low traffic density and topography In such cases, it is desirable to charge lower rates of motor vehicles and passenger taxes to maintain low fares. Similarly, public transport undertkaings may not be able to cover operating costs in metropolitan and larger urban areas, and a direct exchequer subsidy either from the State or Central Government is desirable in such cases.

Promotion of Public Transport

4.4.16 Rates charged for smaller motor vehicles like cars are lower than those for heavier vehicles like buses.* While this policy is justifiable as it seeks to cover costs accor ding to wear and tear of roads, it has the disadvantage of putting a heavier tax burden on public transport. To encourage public transport as an important measure of fuel economy, we would recommend lower rates for large passenger vehicles catering to it.

4.5 Octroi Checkposts

4.5.1 Octroi is presently levied in twelve States (Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Maharashtra, Manipur, Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal) and two union territories of Delhi and Pondicherry. The Jha Committee has estimated octroi revenue for 1976-77 at Rs. 180 crores, while the 1977-78 estimate has been placed at about Rs. 270 crores.) No octroi is levied in Andhra Pradesh, Assam, Bihar, Kerala, Madhya Pradesh, Meghalaya, Nagaland, Sikkim, Tamil Nadu and Tripura.

4.5.2 The need for abolition of, octroi has been emphasized by several committees, notably, the Motor Vehicle Taxation Enquiry Committee (1950), the Masani Committee (1959), the Keskar Committee (1967), the Wankhede Study Group (1971) and recently by the Jha Committee (1978). All these committees considered octroi harmful and obnoxious. While commenting on octroi, the Jha committee observed that it is a regressive duty, violates the principle of free flow of trade across local boundaries, and encourages concentration of industries in metropolitan areas. The Committee's study of effect of octroi on a few selected trunk routes has also brought out that (30 to 46 per cent of effective travel time is lost at check-posts and the socio-economic cost of octroi is much more than the revenue it yields.)

4.5.3 During our visit to States, transport operators have invariably complained that (detentions at octroi checkposts usually account for 20 to 35 per cent of total running time of trucks. It is also argued that frequent idling and stoppages at checkposts result in higher fuel consumption and wear and tear of tyres and brakes of vehicles. Octroi also leads to corruption at checkposts.)

4.5.4 While all previous committees have recommended the abolition of octroi, it has not been possible for the State Governments to accept this recommendation in the absence of an alternative and viable source of revenue for local bodies. For example, the (Madhya Pradesh Government abolished octroi in May 1976 but its experience has not been fruitful.) The State Government had initially replaced octroi by a turnover tax as part of sales tax law. With revision of sales tax law in the State in July 1977, the system of tax on tax was replaced by two levies, namely, (i) basic tax at specified rates on all commodities, and (ii) an entry tax on commodities on which neither sales tax nor turnover tax was applicable. (In 1978-79 the net revenue collected by the State from these two alternative taxes was Rs. 13.72 crores and State liability to the local bodies on the basis of revenue from octroi of Rs. 17 crores in 1975-76. was Rs.22.63 crores, leaving a gap of Rs. 9 crores) The State Government then suggested that 50 per cent of this gap should be borne by the Central Government. The Central Government, however, has been reluctant to provide compensatory grants to State Governments due to financial constraints as well as difficulties involved in allocating Central grants to States in lieu of octroi.

* See annexure 4.2

4.5.5 The Jha Committee recommended that the decision to abolish octroi should not be linked with the identification of an alternative source of revenue, and that it should be abolished in stages, first, in small localities which could be compensated easily and subsequently in such larger localities which do not depend on octroi as a major source of revenue. The Committee was, however, of the view that for the time being octroi may not be abolished in bigger metropolitan cities like Bombay and Calcutta which, as terminal points, account for bulk of octroi income. The Jha Committee also rejected alternative devices, usually suggested for raising revenue by local authorities, such as levy of a surcharge on excise duty on HSD, removal of checkposts followed by self-assessment by transport operators and levy of an entry tax, which, due to undesirable consequences, were not suitable. Instead, it suggested a flat turnover tax on commodities attracting sales tax, limited to less than one per cent of basic tax, as such a tax, in its view, was capable of smooth and efficient implementation even though it was not an ideal solution. We generally endorse the recommendations of the Jha Committee in this matter.

4.5.6 We believe that unless the States adopt a radical approach to abolition of octroi, there is no immediate solution in sight. Considering the fact that this levy provides an easy and independent source of revenue for local bodies, it will be necessary to approach this problem on a pragmatic basis. The suggestion made by the Jha committee to abolish checkposts in a phased manner appears to be the only feasible solution. The Uttar Pradesh Government has successfully abolished 1,800 out of the total of 2,500 octroi checkposts in the State and has also found it possible to compensate loss of revenue to local bodies without any Central assistance. We commend this example for consideration by other States. The State Governments may also consider earmarking a certain portion of road transport revenue to compensate local bodies for revenue loss on abolition of octroi. As road transport is a State subject, the primary responsibility and initiative for abolition of octroi rests with the State Governments. The Centre could also exercise its persuasive powers and encourage State Governments to abolish octroi in stages, even by extending financial assistance to them.

4.6 Summing Up

4.6.1 We are of the view that as a basic principle, transport pricing must be cost-based, that is, the user should pay at least marginal resource cost of transport service. We have also suggested that each transport agency should, as far as possible, generate enough internal resources to cover its capital cost and make some contribution to national pool of investible resources. These principles should be the basis for revision of fare and freight structure of different modes of transport.

4.6.2 We have not been able to find any evidence to show that tax burden on road transport industry has inhibited its growth or is causing loss to operators.

4.6.3 As road transport is a State subject, we recognise that complete uniformity in tax rates, methods of assessment or points of collection as between different States, may not be easy to achieve. However, there is considerable scope for and urgent need to reduce the multiplicity of taxes, rationalise rate-structure and centralise collection, if inter-State road movements are to be made efficient. Passenger and goods taxes could easily be integrated with motor vehicles tax and collected at a flat rate and at a single point rather than vehicle-wise and as a per cent of fare collected in the case of passenger buses.

4.6.4 There are no two opinions that octroi is harmful, obnoxious and inhibits efficiency of road transport, and that socio-economic cost of octroi is much more than the revenue yielded by it. We fully endorse the views of the Jha Committee (1978) that decision to abolish octroi must not be linked with identification of an alternative source of revenue for local bodies and that it should be abolished in stages, starting with small localities of say 25,000 population or less, which could be compensated easily. Even though octroi abolition should primarily be the responsibility of State Governments, we stress that the Central Government should use its persuasive powers and encourage the States in this regard even by extending financial assistance to them.

Annexure 4.1

Level of Road Transport Taxation : Do road users as a class pay more than what they should for use of roads ?

The Central revenue from road transport relates to import and excise duties on motor vehicles and accessories, tyres and tubes, fuel and lubricants. The sources of State revenue are motor vehicle taxes, licence and permit fees, sales tax on fuel and lubricants and taxes on passengers and goods. It is often argued that the overall incidence of multiple taxation on road transport industry is heavy and that road users as a class pay much more than what they should. Data given in table 4.2 show that, excluding import and excise duties on fuel, which are in nature of commodity taxation for mobilisation of general revenues and cannot be categorised as a specific tax on road users, public expenditure on road system has been matching with revenue realised from specific road transport taxation.

2. This matter was studied in detail by the Working Group on Transport Pricing, Taxation and Subsidy. The findings of the Working Group are summarised below :

(i) The argument that level of taxation on road transport is unjustified because Government expenditure on roads falls short of the revenue realised from road users (including customs and excise duties on fuel and sales tax thereon) is based on the assumption that revenue raised by the Government from a particular sector or industry must be spent on that sector alone. In other words taxation should be based purely on "benefit principle". The assumption does not seem to be valid.

(ii) To argue that road transport taxes like excise duty and sales tax on vehicles, components and fuels are all borne by transport operators is to deny any possibility of shifting. It is known that tax burden is not borne by the people on whom it is levied. Some studies show that a part of even "direct" taxes like income tax and corporation tax is shifted forward through higher prices of products or services. Hence it is often extremely difficult to say who ultimately bears the burden of a tax. It may not be unreasonable to suppose that a part of taxes on items like diesel is passed on to consumers of articles carried by road. Viewed thus, road transport tax may be regarded as one way of taxing a large section of the community and, therefore, revenue so collected can legitimately be appropriated by Government to the general pool.

(iii) If taxation level on road transport is to be determined with reference to amounts spent by Government on roads, that is, on calculations of cost-benefit of roads and road transport, all costs of road transport operation (both private as well as social costs) should be taken into account. Road transport entails costs to community, not all of which are reflected in operationa costs, such as those arising from congestion, accidents and pollution. In arriving at the costs, we should take into consideration not only costs of use in the form of wear and tear of roads but also due to congestion, accidents and pollution. These costs are not easy to quantify. Among other costs, we may refer to cost of policing traffic, running transport and vehicles departments, and expenses of Government on research and development relating to roads.

(iv) Even if social costs and benefits are left out, the gap between total revenue currently collected from taxes on roads and cost of road maintenance construction is not as high as is often made out. The estimated burden of taxation on road transport operations involves mainly excise duty and sales tax on diesel oil and tyres and direct fees or taxes like motor vehicles tax, goods tax and permit fees. Against this, one should take into account the fact that, unlike railways, road transport does not pay directly for maintenance and capital costs of road works. In 1972-73, revenue from direct fees and taxes on motor transport amounted to Rs. 187 crores. The total capital invested in roads

was at least Rs. 2,000 crores so that an annual interest cost of Rs. 200 crores should also be charged on road transport sector. In addition, maintenance costs came to Rs. 128 crores. To assess the real burden of taxation on road transport, suitable adjustment should be made. On this basis, tax burden on small operators comes to 2.86 paise per tonne km which is around 21 per cent of total cost. If the burden of taxation on trucks is also allowed, this percentage will go up to 29. These calculations include taxes at all stages, including tax content of inputs required to produce trucks. On this basis there will be many industries where indirect taxation burden will be higher than 29 per cent.

3. In view of this, it is not possible to come to any conclusive jugdement about the propriety of a given level of taxation of road transport by looking merely at revenue ratio realised from road transport to amounts spent on roads. Criticism of taxation of road transport based on ratio of revenue to expenditure on roads is thus untenable. Granting that road development benefits are enjoyed not merely by motorists but by the community as a whole, there is nothing wrong in using road transport taxation as an instrument of general revenue as long as a portion of these taxes is passed on to the general body of users of roads and consumers of commodities carried by road.

Annexure 4.2

Annual Rates of Motor Vehicles Taxes in different States

(Figures in Rs.)

Category	Maharashtra	Andhra Pradesh	Assam
I Motor cycles and motor scooters.	Ranging from 20 to 53 on the basis of unladen weight.	Ranging from 60 to 80 for vehicles below 350 cc. (provided that the unladen weight does not exceed 406 kgs.)	38 and 60 if the unladen weight is 90 kgs. or above.
II Motor vehicles used for carriage of goods or materials such as trucks.	Ranging from 200 to 1200 on the basis of registered laden weight up to 7500 kgs. In excess thereof a surcharge of Rs. 75 for every 250 kgs. is leviable	Ranging from 748 to 3832 on the basis of laden weight up to 15,500 kgs ; in excess thereof an additional charge of Rs. 110 for every 250 kgs is leviable.	420 up to one metric tonne of load ; in excess thereof, Rs. 105 for every additional 1/2 metric tonne or a part thereof is leviable.
III Motor vehicles plying for hire and used for carriage of passengers such as taxis and auto rickshaws.	Ranging from 120 to 240 according to the number of passengers up to 4, beyond which there is an additional surcharge of Rs. 80 per passenger.	Ranging from 120 to 300 according to the number of passengers up to 5.	Ranging from 140 to 1190 depending on the type of vehicles.
IV Other motor vehicles.			
(i) **Private Cars**	Ranging from 88 to 330 as per unladen weight up to 2,250 kgs. provided that the seating capacity does not exceed fifteen.	Ranging from 126 to 360 as per unladen weight.	135 and 165 if the horse power of such vehicles is 14 and above.
(ii) **Passenger Buses**	300 plus 10 for each passenger in excess of fifteen.	Ranging from 250 to 621 on the basis of distance travelled plus 200 for every passenger in excess of six.	**Stage carriage** 56 for every authorised seat.

(Figures in Rs.)

Category	West Bengal	Madhya Pradesh	Jammu & Kashmir
I Motor cycles, motor scooters.	(i) Ranging from 24 to 32 in case of individual owners. (ii) Ranging from 48 to 64 in case of companies.	36 and 48 if unladen weight is 90 kgs. or above.	48
II Motor vehicles used for carriage of goods or materials such as trucks.	Ranging from 175 to 1245 as per registered laden weight upto 8000 kgs. In excess thereof Rs. 80 for every 250 kgs. is leviable. In addition, if the vehicle is fitted with solid tyres 25 per cent of the above plus an additional surcharge of 30 per cent per annum.	Ranging from 276 to 2978 as per the registered laden weight up to 16000 kgs. In excess thereof for each additional 100 kgs. or part thereof, (Rs. 190 is also leviable).	Ranging from 400 to 902 as per the registered laden weight.
III Motor vehicles plying for hire and used for carriage of passengers such as taxis, auto rickshaws.	Ranging from 200 to 360 according to seating capacity up to 4; 360 for 5 plus 60 for every additional seat, plus 25 per cent of the above if the vehicle is fitted with solid tyres.	48 for each seat for vehicles with seating capacity up to 25; for vehicles other than cars 60 for each seat if the unladen weight is up to 90 kgs, 72 if it exceeds 90 kgs.	Ranging from 240 to 320 according to the number of passengers carried (not exceeding eight).
IV Other motor vehicles			
(i) **Private Cars**	(i) **Owned by individuals**: 90 if the unladen weight is 1000 kgs, 120 for the unladen weight up to 1200 kgs. 120 plus 30 for every 800 kgs. in excess of 1200 kgs. (ii) **Owned by Companies**: Two times the above rate.	Ranging from 84 to 228 depending on unladen weight.	120 and 1200 if the horse power of such vehicles is 14 and above.

(Figures in Rs.)

Category	West Bengal	Madhya Pradesh	Jammu & Kashmir
(ii) **Passenger Buses**	**Stage carriage** Ranging from 600 to 1980 according to number of passengers up to 33 ; 30 for every additional seat beyond 33.	Ranging from 84 to 1248 as per unladen weight up to 6100 kgs. 336 in addition for an additional weight of 1000 kgs. or a part thereof.	**Stage Carriages** : (Buses) Ranging from 600 to 1000 depending on the number of passengers upto 8 and above.

Category	Himachal Pradesh	Tripura	Orissa
I Motor cycles, motor scooters.	25 and 50 if the unladen weight is 90 kgs. or above.	45 (individual owners) 90 (companies)	48 and 60 if the unladen weight exceeds 90 kgs.
II Motor vehicles used for the carriage of goods or materials such as trucks etc.	Ranging from 172.50 to 1000 as per the unladen weight.	Ranging from 315 to 1622 as per the registered laden weight up to 1228 kgs.	Ranging from 330 to 2090 as per the laden weight up to 800 kgs. For every additional 500 kgs. or part thereof in excess of 8000 kgs. Rs. 120 is leviable.
III Motor vehicles plying for hire and used for carriage of passengers such as taxis, auto rickshaws.	Rs. 75 per seat for taxies.	Ranging from 105 to 200 according to the seating capacity up to 5; Rs. 40 for every additional seat beyond 5.	120 for a seating capacity up to 6; there after 144 for each additional seat.
IV Other motor vehicles			
(i) **Private Cars**	Ranging from 100 to 175 as per the unladen weight up to 2000kgs. In excess thereof for every 1000 kgs, a surcharge of Rs. 125 is leviable.	Cars : 100-124 (personal use of owners) 202-248 by companies. Jeeps : 124 personal use 248-Companies **Station Wagons** 315-Personal use 630-Comnies.	96 to 268 depending on unladen weight.
(ii) **Passenger Buses**	**Stage carriage** : Ranging from the 105 to 4200 (Rs. 105 per seat)	**Stage carriage** : 336 upto 8 persons ; Rs. 42 for every additional seat beyond 8.	**Stage carriage** : Ranging from 140 to 240 for a seat according to distance from 160 km to 320 km ; for every standing person Rs. 100.

Category	Uttar Pradesh	Punjab	Kerala
I Motor cycles, motor scooters.	35 and 55 if the unladen weight exceeds 90 kgs.	27.50 and 50.00 if the unladen weight is 200 lbs. or above.	36 to 60 on the basis of the unladen weight.
II Motor vehicles used for carriage such as trucks etc.	Ranging from 285 to 350 for the first 762 kgs. of weight depending on the class of routes; for every additional 51 kgs. a sum ranging from 8 to 13 (depending on the class of route) is also leviable.	Ranging from 172.50 to 1000, as per unladen weight.	Ranging from 420 to 4800 as per the laden weight up to 15000 kgs; 1200 plus 25 for every 250 kgs. or part thereof in excess of 15000 kgs.
III Motor vehicles plying for hire and used for carriage of passengers such as taxis, auto rickshaws.	Ranging from 275 to 550 depending on seating capacity up to 60.	100 for auto rickshaws and 100 per seat for taxis.	800 to 400 according to the number of passengers up to 60.
IV Other motor vehicles			
i) **Private Cars**	Ranging from 125-250 as per the unladen weight.	Ranging from 55 to 137.50 according to the seating capacity up to 4; for every additional seat Rs. 34.40.	144 to 300 as per the unladen weight
ii) **Passenger Buses**	**Transport vehicles** Ranging from 565 to 1290 depending on number of seats from 6 to 32 and the type of route (A, B or C). Beyond 32, for every additional seat Rs. 45 to 105 depending on the type of route.	**Stage Carriage** 200 per seat subject to maximum of Rs, 20,000; Mini Buses Rs. 3,000.	**Stage carriage** 360 for each seated passenger upto a distance of 200 km; 400 for each seated passenger if the distance exceeds 200 km; 120 for every standing passenger.

Chapter 5

Freight Equalisation

5.1 Freight equalisation and its impact on location of industries and regional development was examined in depth by an inter-Ministerial group on freight equalisation (Marathe Committee). Although the group looked into various aspects of freight equalisation within a general frame, we felt that in view of the persistent demand from various quarters extension of freight equalisation to essential items of mass consumption required a closer look than was given in the Marathe report. Accordingly, a working group was set up to examine the issue of freight equalisation, including the need for extending it to articles of mass consumption. Our analysis and recommendations draw heavily upon the work of this group.

5.2 Present Status of Freight Equalisation Schemes

5.2.1 A freight equalisation scheme is at present functioning for iron and steel, cement and petroleum products. It also operates for fertilisers for which not only freight but total production cost is also equalised by means of a subsidy resulting in a fixed pool price for sale. Similarly, Food Corporation of India distributes foodgrains in different areas with a built-in equalisation of freight prices.

5.2.2 In the operation of freight equalisation scheme, a carrier like railways does not give any subsidy. Carriers charge for freight at normal tariff rates. Freight equalisation is generally operated by pooling only railway freights but for certain areas where rail heads do not exist, such as hill areas in the north-eastern region and destinations in Jammu & Kashmir, the scheme is extended to cover road transportation. In these cases rail freight up to rail head and road transport charges are adjusted and equalised. The scheme is operated through establishment of self-financing accounts, from which excess amounts paid for larger hauls are drawn for which credits are made when freight is moved over less than the average distance, equalisation freight being the freight for an average distance over which the commodity moves.

5.2.3 Besides the officially managed freight equalisation scheme for these commodities, freight equalisation is also undertaken by industries and manufacturers to capture national markets. Under such an arrangement uniform prices are charged throughout the country, regardless of consumer location, variation in price, if any, being due to local taxes.

5.2.4 The original motivation for introducing freight equalisation was to promote industrial development of areas located further away from major sources of raw materials and production centres in an effort to promote balanced regional development. From this point of view, freight equalisation was confined to industrial commodities. It is argued that operation of freight equalisation policy for industrial inputs has led to location of industries which is not optimal on grounds of social efficiency. This is one of the key issues we have considered. However, freight equalisation is not the only instrument to achieve balanced regional development. Other policy instruments can be more effective in achieving this objective. For example, measures such as licensing policy, an appropriate regional distribution of public investment, credits and fiscal policies, and provision of essential infrastructure etc., are important instruments which can help and promote balanced regional growth.

5.3 Effect of Freight Equalisation Schemes

5.3.1 The effect of freight equalisation is two-fold. Where it is operated for intermediate products, such as iron and steel, the intention is to disperse industrial activities. By contrast, where it is applied to finished or semi-finished goods like

cement, the effect is to bring industry closer to raw material sources. However, freight equalisation is not the only means for dispersal. There could be a number of policies which support or arrest this trend.

5.3.2 An examination of locational effects of freight equalisation scheme suggests that while for pig iron and cement, transport costs constituted a significant proportion of total production costs (21 per cent), for other commodities these costs were not so significant, as they ranged between 4 and 8 per cent only. However, for coal, not covered by freight equalisation scheme, transport cost constitutes as high a proportion as 55 to 60 per cent of total production costs. The average lead of commodities covered under freight equalisation has increased. This is particularly so for cement, where the average lead has increased from 372 km. in 1960-61 to 676 km. in 1977-78. By contrast, the average lead for coal has shown a decline from 664 km. in 1960-61 to 586 km. in 1977-78. Assuming that an increase in lead means an increase in real transport costs to the extent that traffic leads have increased due to freight equalisation, it may be said that operation of this scheme has increased real transport costs to the economy. But by subsidising long-distance freight, it has promoted industrial locations in areas where it would otherwise have not been possible. However, taking into account the totality of effect, the working group has observed that the beneficial effect in terms of industrial dispersal was more than offset by increase in real transport costs.

5.3.3 We also examined growth of industrial employment in various States between 1965-75 and found that freight equalisation has had little effect in generating employment activity in backward regions. Given the effect on real transport costs this policy imposes, it appears to us that there is a case for phasing out existing freight equalisation scheme.

5.4 Freight Equalisation for Commodities of Mass Consumption

5.4.1 Besides freight equalisation for raw materials and intermediate products, there has been a demand for introduction of freight equalisation for essential consumer goods. Some States have represented that the heavy transport charges they have to incur for providing essential consumer goods to people in inaccessible areas substantially increase prices. Therefore, there is need to introduce freight equalisation for these goods to enable consumers in these areas to pay the same prices as in other parts of the country. This question was considered by the Marathe Committee which observed that freight equalisation would be beneficial only if it was extended to consumer goods which satisfy the following conditions :

(i) the item should be essential and for mass consumption;

(ii) it should be an important constituent of consumption basket of an average citizen, especially of weaker sections of population;

(iii) freight should account for a substantial proportion of final consumer price in inaccessible areas;

(iv) the item should be subject to perfect market and stable prices so that the benefit of freight equalisation is actually transmitted to the final consumer.

5.4.2 Extension of freight equalisation to items of mass consumption was also examined at our instance by the working group, which agreed with the criteria suggested by the Marathe Committee. As commodities selected for freight equalisation should form an important part of consumption of an average citizen, the working group analysed the role of following commodities in the family budget :

1. Cereals
2. Pulses
3. Edible oils and vanaspati
4. Potato and onion
5. Sugar, gur and khandsari
6. Salt
7. Tea
8. Kerosene and domestic fuels

9. Common clothing
10. Standard footwear
11. Common drugs and medicines
12. Soaps and detergents
13. Matches, dry cells and hurricane lanterns
14. Textbooks and Stationery
15. Bicycles, bicycle tyres and tubes.

5.4.3 The analysis was undertaken separately for urban and rural families. Relevant data are shown in table 5.1. While food items account for about three-fourths of total family budget expenditure in rural areas, they account for two-thirds of total expenditure in urban areas. If other articles of mass consumption such as kerosene, matches and coal, are added to family budget expenditure, the proportion accounted for by these commodities together comes to over 80 per cent in rural and over 75 per cent in urban areas. Hence, these commodities do satisfy the first two criteria suggested by the Marathe Committee. However, the Committee also suggested that transport costs should constitute a significant proportion of final price paid by the consumer. When this test was applied to these commodities, we found that transport costs are not significant in final delivered price paid by the consumer. Rail freight as a proportion of total output at factor cost is shown in table 5.2.

Table 5.1.

All India Consumption Pattern Separately for Rural and Urban Areas (in percentage terms)

S. No	Consumption Category	Sector		Combined all-India
		Rural	Urban	
1	2	3	4	5
1.1	Rice and products	23.46	14.94	21.29
1.2	Wheat and products	9.24	8.90	9.15
1.3	Coarse cereals	10.81	3.05	8.83
1	Total cereals	43.52	26.89	39.28
		(20.62)	(1.70)	(15.80)
2.1	Arhar (Tur)	1.49	1.47	1.48
2.2	Moong	0.47	0.52	0.44
2.3	Other pulses	1.85	1.34	1.73
2	All pulses	3.75	3.33	3.65
		(1.38)	(0.06)	(1.04)
3.	Foodgrains	48.46	30.54	43.89
		(22.54)	(1.77)	(17.25)
4.1	Vanaspati	0.32	1.10	0.52

(*Table 5.1 Contd*)

1	2	3	4	5
4.2	Mustard oil	1.60	1.41	1.55
4.3	Groundnut oil	1.26	2.02	1.45
4.4	Other edible oils	0.57	0.69	0.60
4.	All edible oils	3.75	5.23	4.12
		(0.30)	(0.00)	(0.22)
5.1	Potato	1.06	1.20	1.10
5.2	Onion	0.55	0.55	0.55
6.1	Sugar	1.41	2.61	1.73
6.2	Gur	1.64	0.59	1.37
6.3	Other Sugar	0.09	0.07	0.08
6.	Sugar Total	3.15	3.27	3.18
		(0.36)	(0.00)	(0.27)
7.	Salt	0.17	0.11	0.15
8.	Tea (leaf)	0.51	0.80	0.58
	All food items	74.89	67.73	73.07
		(30.05)	(3.16)	(23.20)
9.1	Coke	0.02	0.34	0.10
9.2	Coal	0.06	0.40	0.15
9.3	Kerosene	0.96	1.20	1.02
9.4	Matches	0.23	0.21	0.22
9.5	Other fuel and lighting	4.32	3.86	4.20
9.	Fuel and lighting total	5.59	6.01	5.69
		(1.45)	(0.18)	(1.13)
10.1	Cloth for dhoti and saree	2.60	1.09	2.21
10.2	Cloth for shirt, pajama, etc.	1.94	0.99	1.70
10.3	Other clothing	2.21	2.67	2.33
10	Clothing total	6.75	4.75	6.24
		(0.00)	(0.00)	(0.00)
11	Footwear	0.49	0.38	0.46
12	Medicine	1.92	1.98	1.93

(*Table 5.1 Contd.*)

1	2	3	4	5
13.1	Toilet soap	0.23	0.51	0.30
13.2	Washing soap	0.66	1.14	0.78
14	Electric batteries	0.00	0.00	0.00
15	Books and stationery	0.09	0.41	0.17
16	Bicycle and cycle tyres and tubes	0.11	0.08	0.10
		100.00	100.00	100.00
	Total monthly per capita expenditure : Rs.	(53.01)	(70.77)	(56.63)

Note : (i) Figures in brackets relate to percentage homegrown consumption except for the last item, namely, total monthly per capita expenditure.

(ii) Separate data are not available for hurricane lanterns.

Table 5.2

Rail Freight as a Proportion of total output at Factor Cost I

S. No.	Consumption category	Rate
1	2	3
1.1	Rice and products	0.0029
1.2	Wheat and products	0.00395
1.3.1	Jowar	0.00107
1.3.2	Bajra	0.00108
1.3.3	Other cereals	0.00300
2	Pulses	0.00341
3.1	Vanaspti	0.00012
3.2	Other edible oils	0.00232
4.1 4.2	Potato Onion	0.00158
5.1	Sugar	0.00119
5.2 5.3	Gur Other Sugar	0.00050
6.	Salt	0.00207
7.	Tea (leaf)	0.00094

(*Table 5.2 Contd*)

1	2	3
8.1	Coke	Not available
8.2	Coal	
8.3	Kerosene	0.00399
8.4	Matches	0.00049
8.5	Other fuel and lighting	Not available
9.1	Cotton textile	0.00018
9.2	Cotton textile (Khadi and Handloom)	0.00024
9.3	Other textiles	0 00020—0.00033
9.4	Readymade garments	0.00024
10.	Leather footwear	0.00011
11.	Medicine	0.00010
12.1	Toilet soap	0.00102
12.2	Washing soap	
13.	Electric Batteries	0.00212
14.	Books and stationery	0.00207
15.1	Bicycle	0.00218
15.2	Bicycle tyres and tubes	0.00046

1. Rates relate to the base year (1977-78) of the Revised Draft Plan (1978-83) and have been calculated at 1976-77 prices.

It is quite evident that transport costs are not important; in fact, rail transport cost does not exceed more than 0.4 per cent of total output at factor cost. In view of this evidence, in our view freight equalisation will not make a significant difference in final price paid by the consumer for mass consumption articles. There are, of course, variations in transport costs but these are not significant enough to alter our conclusion.

Price Stability

5.4.4 One of the criteria suggested by the Marathe Committee for application of freight equalisation to articles of mass consumption is that the commodity should maintain perfect competition and stable prices. In our view, this condition is all the more difficult to be satisfied by goods of essential consumption, most of which are agricultural products liable to seasonal fluctuations in supply and demand and vagaries of nature. Most agricultural commodities are traded under competitive conditions but quite a few like tea and sugar are under oligopoly control. All in all, therefore, considering market imperfections and supply rigidities, together with conventional fluctuations of agricultural production, it is hardly realistic to expect prices of commodities of mass consumption to remain stable and competitive for application of freight equalisation.

5.5 Need for Revamping Public Distrbution System

5.5.1 While in our view freight equalisation as it is presently operated in India will not have an impact on final prices consumers have to pay for articles of mass consumption, we are concerned with the need for supplying these commodities at

reasonable and stable prices, irrespective of geographical location of consumers. The evidence we have, however, shows that a solution for this problem has to be sought elsewhere, not in extension of freight equalisation. Differential prices paid by consumers for homogenous goods in different parts of the country are due to imperfections and rigidities existing in the distribution system, including inadequacies of transport, especially in the hilly and inaccessible areas. To cite the classic example of salt, the relatively high price for this commodity paid by consumers in the northeastern region is not due to transport costs but due to market manipulations and transport difficulties.

5.5.2 To ensure availability of essential commodities at reasonable prices, the existing public distribution system will have to be a more effective vehicle to subserve its avowed objective of price stabilisation. In such a system, efficiency of distribution and minimisation of transport costs would be a central feature. To this end, existing public distribution arrangements will have to be suitably strengthened and streamlined, so that the common man can buy essential commodities in adequate quantities at uniform prices throughout the country. The working group has found that price variations in different States and high prices are not confined to inaccessible areas, but effect equally the so-called accessible States.* Clearly, accessibility or lack of it is not the only factor determining inter-State price differentials. Higher prices in certain areas are not due to differences in rail freights. A comprehensive public distribution system which can eliminate market imperfections, is, in our view, a more effective and efficient way of providing articles of mass consumption than through freight equalisation.

5.6 Summing Up

5.6.1 We endorse the view that freight equalisation in industrial commodities does not meet the desirable objective of dispersal of economic activity but can lead to non-optimal location of industries We, therefore, recommend that it should be phased out. For articles of mass consumption, the impact of freight equalisation in final prices is not significant. We, however, support the need for supplying these articles at uniform prices throughout the country. To this end, the public distribution system should be strengthened so that inter-regional differences in prices of essential articles are minimized. If this requires a subsidy, it should be explicit and directly through the public distribution system.

* Jammu & Kasmir, although relatively inaccessible is a low-price State because of heavy subsidisation of Commodity prices.

Chapter 6

Machinery for Co-ordination of Transport Policy

6. 1 Background

6.1.1 The constitution of an appropriate and effective agency to co-ordinate transport policies and programmes at the Central and State levels was examined earlier by the Committee on Transport Policy and Co-ordination (CTPC) 1966. While considering various aspects of transport policy, such an agency would have to deal with three different but related sets of functions, namely, planning, co-ordination and operations. Planning, according to CTPC, involves in the first place determination of volume and composition of traffic and its allocation between modes of transport on the basis of their comparative cost and efficiency. Secondly, it aims at formulation, in broad and indicative terms, of policies and programmes to guide investment decisions by transport agencies in public and private sectors. The term "operations" includes actual running of a service or an undertaking within the general system provided by a scheme of planning and co-ordination which, together, constitute the main substance of a national transport policy. Measures for co-ordination, according to CTPC, lay between planning at one end and operations at the other. The principal task of co-ordination is to review transport situation from time to time both in aggregate and in different regions to ensure that no imbalances occur between availability of modes of transport and requirements of economy.

6.1.2 Within this functional framework, CTPC considered that the Planning Commission, acting in close co-operation with Central Ministries and the State Governments, was an agency for planning development of transport system. The Planning Commission was to be supported in this task by a Joint Technical Group (JTG) for Transport Planning formed by drawing expertise from Ministries and organisations concerned with transport. The operations of transport services were naturally left to appropriate executive agencies which were to furnish data and information for planning and co-ordination. For co-ordination, CTPC proposed a two-tier structure, one between Ministries at the Central level and the other between the Centre and the States. At the Central level, it recommended the constitution of a transport planning and co-ordination committee consisting of the Member of the Planning Commission concerned with transport as Chairman and Secretaries of Ministries of Transport, Civil Aviation, Finance, the user Ministries and Chairman of the Railway Board as members. Within the Planning Commission, JTG was to serve as a technical secretariat of this Committee, the principal task of which was to meet regularly to review transport situation and consider its reports and studies. CTPC expected the proposed transport planning and co-ordination committee to reach agreed decisions on most transport matters. However, to consider important issues of policy and provide guidance from time to time, CTPC suggested the constitution of a committee of Ministers, of Ministries for Transport, Industry, Planning, Finance and Member of the Planning Commission in charge of transport. This committee was to be constituted by the Prime Minister who was also to appoint one of its members as the Chairman.

6.1.3 CTPC noted that a few forums were already functioning within the Ministry of Shipping and Transport to co-ordinate transport development at the national level. These included the National Harbour Board and the Transport Development Council, the latter being supported by the Advisory Committee for Roads and Inland Water Transport. The Board was presided over by the Minister of Transport and included Ministers from States as well as representatives of major ports. The Council, set up in 1958 as a high-level body to advise Government on matters of policy relating to roads, road transport and inland water transport, was also presided over by the Minister of Transport. CTPC recommended continuation of both these forums which had served the useful purpose of examining common issues of policy affecting areas of transport sector falling within their respective spheres.

6.1.4 For co-ordinating development of road haulage industry, there was already the Inter-State Transport Commission, constituted under the Motor Vehicles Act, 1939 (as amended in 1956) within the Ministry of Transport. CTPC suggested that this Commission, be redesignated as the Inter-State Road Transport Commission and strengthened by appointing a full-time chairman drawn from public life and providing adequate staff for maintaining information and studies concerning road transport.

6.1.5 This structure was enough, according to CTPC, to co-ordinate transport policies and programmes at the national level. However, CTPC had realized that, considering the nature of transport industry and division of constitutional responsibilities for regulation and development of transport system, it was not possible to evolve a co-ordinated transport policy, much less to implement it, without complete co-operation between the Centre and the States. To secure an adequate measure of consensus between the Centre and the States on transport policy and ensure co-ordinated action by way of implementation, the Committee therefore, recommended the setting up of a Council for Transport Co-ordination. This Body was to include members of the Committee of Ministers on transport at the Centre and State Ministers in charge of transport and roads. The Council was expected to supplement and carry further the work of the Transport Development Council, especially in fields where larger considerations of policy demanded unified action between the Centre and States and transport sector problems as a whole were to be examined in their wider inter-State and national setting.

6.1.6 At the State level CTPC had not visualized any precise arrangement for co-ordinating transport policy, except for existence of State transport authorities which were expected to co-ordinate development of road transport in States within the overall framework determined by the Inter-State Road Transport Commission and transport planning and co-ordination committee at the Centre.

6.1.7 Though a high-level committee had made a number of recommendations for constitution of a suitable co-ordinating agency, no effective institutional arrangements have so far been evolved. On the contrary, the arrangments for inter-modal co-ordination are either inactive or have been dismantled. For example, both the Cabinet Committee on Transport and Tourism and Secretaries Committee on Transport, Tourism and Aviation, which used to meet at intervals for inter-modal co-ordination, have not been functioning for some time. Similarly, the Joint Technical Group for Transport Planning, which was to serve as a technical secretariat for the proposed transport planning and co-ordination committee, was discontinued after the valuable work it had done in commodity flows and regional transport surveys. Thus, for all practical purposes, the Planning Commission presently is the only institution which through investment and other decisions taken in the context of Five Year and Annual Plans and inter-State consultations, has been co-ordinating transport policies and programmes. The Inter-State Transport Commission has more or less remained a defunct body, and the Transport Development Council and the National Harbour Board have merely served as discussion forums.

6.1.8 That this is not an adequate or satisfactory arrangment for co-ordinating transport policies and programmes is obvious. The Planning Commission only co-ordinates inter-model investment decisions; many important segment of policy like pricing of transport agencies being determined by respective agencies themselves. Co-ordination of transport policy cannot be achieved through co-ordinating investment and pricing decisions alone; it also requires co-ordination at the operational level. Such co-ordination is essential for optimising use of available transport capacities. For example it is possible to optimize existing port capacity by regulating port entry and to ensure congestion-free flow of goods to and from the country. Most existing institutional arrangements for co-ordinating transport policies and operations are of advisory nature.

6.2 Rationale of Co-ordination

6.2.1 Co-ordination of transport services should aim at organising the transport system in such a way as to allow each form of transport to retain its separate identity and, at the same time, to regulate relations between various agencies to promote efficiency and economy in use of resources for transport sector as a whole and satisfy total transport demands of the economy. The central

purpose of transport co-ordination is to create such technical, economic and other conditions for allocation of traffic among modes of transport as will help development of transport facilities in eace mode in required proportions to meet needs of the economy at minimum cost to society.

6.2.2 In principle transport co-ordination can be achieved by controlling investment and fares and freights charged by different agencies and by administrative regulation and licensing of services. Investment decisions in transport are co-ordinated to a large extent by the Planning Commission. Responsibility for development of railways, national highways, civil aviation, major ports and shipping rests entirely with the Central Government, while development of roads other than national highways, minor ports, inland water transport, and urban transport other than railway projects is broadly the States' responsibility.

6.2.3 The practice followed so far by the Planning Commission for co-ordinating transport investment by operating on traffic trends has proved generally satisfactory and inter-modal allocation of traffic so determined has by and large met needs of consumers. In an attempt to improve its methodology the Commission has, from the Fourth Plan, adopted the convention of setting up in collaboration with concerned Ministries a number of planning and working groups for different sectors of transport to make a critical review of progress made in the previous Plan, assess the likely requirements for transport, and formulate proposals for future development in respective sectors. The Planning Commission has also been advising State Governments to constitute similar working groups in transport sector. Being inter-Ministerial, these working groups are expected to establish linkages between the likely demands for and supplies of transport both in aggregate and constituent parts, so that their recommendations could provide a correct basis for directing transport investment into the desired channels.

6 2.4 Except in inter-modal investment decisions the Planning Commission's role is purely advisory The sanction behind the National Plan formulated by the Planning Commission is of a consensus, not statutory in nature. There are also procedural delays. Even after the Plan has been approved by the Cabinet, the projects included in it are not automatically implemented unless they are further approved by the Public Investment Board (PIB), Ministry of Finance and the Cabinet. Moreover an anomalous situation has been created in co-ordinating transport investment, as while prior approval of PIB is needed for any investment project involving an expenditure of Rs. 5 crores or above, rail investment projects do not need PIB approval. Thus, procedures vary for different modes and are applicable only to Governmental investment, limiting their effectiveness in overall co-ordination. We feel that criteria for appraising transport projects should be common, irrespective of mode and agency.

6.2.5 There is no mechanism for co-ordinating transport pricing decisions. Nor is there any effective administrative or licensing framework to bring about co-ordination between modes of transport at the Central or State levels.

6.2.6 Transport pricing decisions are generally made for each mode by the concerned agency without any guidance or directive from a co-ordinating authority. Historically, rail rate structure in India has been determined in the context of "what the traffic can bear"; only recently the rail system has tended to adopt cost-based rates for different kinds of traffic. It appointed a Rail Tariff Enquiry Commitee to look into fare and freight structure and make suitable recommendations. Thus, while the rail system aligns fare and rate structure with costs from time to time, no such machinery or system has been evolved for road transport. Although, under Motor Vehicles Act, 1939 (as amended subsequently), States can issue diiections to the transport authorities to determine fare and freight for stage, contract and public carriers, it is difficult to co-ordinate them. First, there is a plethora of fares and freight rates emanating from pricing practices in various States. Secondly, enforcement of rates prescribed by any single authority is difficult. For such modes of transport as inland water transport, coastal shipping and civil aviation, powers for fixing fares and freight rates are vested in the Central Ministries and, to the extent they have jurisdiction over these modes, co-ordinated action is theoretically possible but not in practice.

6.2.7 In our view, there is need for a centralised pricing authority to recommend a common criterion for fixing fares and freight rates for different

modes. In principle it is sensible to establish a single co-ordinating agency for transport in which the functions of pricing, investment and regulation are vested for effective and meaningful co-ordination. For this reason we consider constitution of a National Transport Commission important. However, if our recommendations for establishing such a Commission is not accepted, we recommend setting up of an independent transport pricing board as a partial solution to problems of transport co-ordination. The composition and functions of the pricing board may follow the pattern described for the National Transport Commission in the following section.

6.3 Machinery for Co-ordination

6.3.1 Keeping in view the federal structure of our polity and division of responsibilites for transport between the Centre and the States, the problem of devising a suitable agency to co-ordinate transport services should be viewed from two angles. First, an agency for horizontal co-ordination among modes should be devised so that each serves as a complement to the other in its common task of transport at a minimum cost to the community. Secondly, a vertical integration has to be achieved between the Centre and the States and within each State as well as between the State Government and regional and local authorities dealing with transport. Clearly for effective implementation of transport policy, co-ordination must be attained in both these respects at each administrative level in the economy.

6.3.2. The overall responsibility for framing a national policy for development of transport must rest with the Central Government, which alone can take an integrated, all-India view of transport needs of the economy and determine proportions in which these should be met in conformity with priorities and objectives of socio-economic policy. Any institutional arrangement for co-ordination of transport services should also function within the broad framework of a national transport policy approved by the Central Government.

6.3.3 At Central level co-ordination is difficult because at present three main agencies are responsible for providing transport services, namely, the Ministries of Railways, Shipping and Transport and Civil Aviation. In principle, functions entrusted to these Ministries could be assigned to a single, unified Ministry in charge of transport. If such a single Ministry of Transport is set up for all modes, it would be easier to view various agencies as a composite network for investment as well as pricing decisions, without having to rely on an outside authorty for co-ordination. We seriously considered this proposal but eventually found it somewhat impractical as a single Ministry of Transport would have to carry an immense burden of work in the present circumstances. Already each Ministry concerned with a particular mode of transport is carrying a heavy responsibility for its development. In such a situation a single Ministry in charge of all modes is likely to slow down decision-making processes, jeopardising transport development programmes. It appears to us that a more effective solution for transport co-ordination should be sought within the existing structure of Central Government.

6.3.4 Two feasible institutional arrangements suggest themselves for consideration. One is to rely primarily upon the Planning Commission to bring about the desired level of co-ordination in transport sector; for it can in principle effectively co-ordinate inter-modal investment decisions, provided its data base is improved. The two-data key-sets required for any scheme of inter-modal traffic allocation relate to traffic flows and transport cost. A beginning has been made in this direction through setting up of a systematic study in the Planning Commission of traffic flows and transport costs. This is, however, a one-time exercise and can only be of limited relevance for future investment planning. What is, in fact, required are collection and analysis of such data on a continuing basis. For, in a country of India's size, with varying regional and geographical characteristics, traffic patterns and cost relationships are likely to change at short notice, necessitating quick adjustment in investment allocations from year to year. This is one of the difficulties the Planning Commission is presently facing and will continue to face in the years ahead.

6.3.5 Another problem involved in relying only on the Planning Commission for co-ordinating transport policies is that while it can co-ordinate investment decisions as part of its

investment planning function, this would still leave co-ordination of pricing and regulatory aspects beyond its purview. No doubt, for fixation of fares and freights an independent co-ordinating agency on the lines suggested could be set up. But, in that case, we shall have a dual structure with powers for co-ordinating transport investment vesting in the Planning Commission and those for pricing in transport pricing board. This can hardly be an effective solution for co-ordination of a national transport system.

6.3.6 All this leads us to examine other organisational arrangements which seem to be more feasible and effective as a policy instrument, namely, a National Transport Commission at the Centre and Transport Boards at State levels. The proposed Commission should be concerned with all modes and deal with all aspects of transport policy, including investment, pricing and regulation, within a common policy framework. The principal tasks of the proposed Commission could be :

(1) To survey from time to time traffic pattern flows and real movement costs, and frame a correct policy "mix" to channelise traffic into various modes;

(2) To analyse demand for transport services scientifically and determine share of different modes in projected traffic in an effort to evolve an optimal inter-modal mix;

(3) To examine fare and freight structure of transport agencies and bring them in close conformity with real costs;

(4) To study fiscal and taxation policies, including subsidies, followed by both Central and State Governments in respect of transport to ensure that no distortions or inefficiencies are introduced in spatial resource allocation;

(5) To monitor functioning of transport system on a continuing basis and identify well in time any imbalance between availability of modes and requirements of economy, both in aggregate and constituent parts, and suggest suitable measures to correct it;

(6) To suggest specific measures for regulation and development of transport in pursuance of objectives and principles of a national transport policy, as approved by Governments; and

(7) To advise Central or State Governments on any other matter of transport policy referred to it, including undertaking of cost-benefit appraisal of special transport proposals of national importance, on which its opinion may be sought by any Government agency.

6.3.7 The proposed Commission could either be a statutory body formed under an Act of Parliament or a body set up by a simple resolution of the Central Government, such as the Planning Commission itself. The decision on the Commission's status is left to the Central Government which, doubtless, would consult State Governments on it. We are inclined to prefer a non-statutory body which may be set up by the Planning Commission on its own initiative by issuing an appropriate resolution to that effect. The main reason why we prefer the proposed Commission to be a non-statutory rather than a statutory body is to provide for flexibility in its scope of functions and day-to-day operations. Ultimately, the usefulness and effectiveness of the proposed Commission would depend upon its composition and work. For this, if for no other reason, we recommend that the Commission should have as its members, persons of wide and varied experience, including that of transport sector. In particular, the chairman of the proposed Commission should be a person of high standing in public life, with a rich background of administrative experience in various fields of government so as to provide a broad perspective for policy formulation and effective co-ordination. Other members of the Commission, not exceeding six, should be experts on various modes. It would be functionally useful to have a transport economist on the Commission as a member.

6.3.8 To make the Commission more effective and purposeful in policy formulating processes, we recommend that its chairman should be equivalent in rank to that of a Member of the Planning Commission and other members of secretary to the Government of India. The Commission may draw technical staff from the three

transport Ministries, the Planning Commission, transport undertakings and academic institutions. There should be a regular turnover of staff to get fresh ideas.

6 3.9 The Commission so constituted would in effect be an expert body, the services of which would be available to the Planning Commission in formulation of transport investment programmes and projects and to concerned Ministries State Governments and executive agencies for determination of fares and freights on rational considerations and other related matters. It can also contribute to regulations and operation of transport system from the point of view of users. For this purpose it may investigate problems faced by users and suggest remedial measures, especially where national interests are involved.

6.3.10 An independent non-statutory body of this type would be free to suggest measures of co-ordination for smooth functioning of the system better than present organisational set up is capable of doing.

6.3.11 The establishment of a Transport Commission may lead to restructuring of present institutional arrangements devised for co-ordinating transport policy. In some cases the present arrangements may not be continued, as their functions would have been entrusted to the Commission.

6.3.12 The idea of setting up a National Transport Commission is not new. Such a proposal was made by M.R.Bonavia, a British transport expert, in his memorandum submitted to the earlier Committee on Transport Policy and Co-ordination. But the Commisson proposed by us is a purely planning and co-ordinating agency which will not take up management responsibility. The nearest parallel to the proposed Commission we could think of, is the Canadian National Transport Commission, a statutory body, set up in 1967, with the explicit objective of co-ordinating transport policies and advising the Minister of Transport on evaluation of an optimal transport network in that country.

6.3.13 The proposed Commission is not only expected to bring about inter-modal co-ordination at the Central level; it will also co-ordinate transport policies between the Central and State Governments. Instead of many co-ordinating agencies recommended by our predecessor Committee, we emphasise that only one agency can effectively co-ordinate activities of Ministries and agencies at the Centre on the one hand and between the Centre and Statres on the other.

6.3.14 we also recommend that similar arrangements be considered for co-ordinating transport policies and programmes at the State and local levels within the overall policy frame prepared by the Central Covernment. We would suggest that, more or less on the same lines as the National Transport Commission at the Centre, State Governments should set up Transport Planning Boards to co-ordinate transport development programmes in the States. These Boards may also regulate licensing of motor and other forms of transport in their respective areas.

6.3.15 In a later Chapter* we have recommended establishment of a single transport authority for large urban centres which would inter-alia bc responsible for planning and implementation of schemes for all modes, including traffic control and regulation, formulation of fares policy and land-use planning. Such authorities already exist in varying forms in the three major metropolitan cities, namely, Bombay, Calcutta and Madras. These authorities are engaged in planning and regulation of transport as part of an overall urban development planning exercise. In our view this is a desirable institutional arrangement which may be extended to other larger cities to promote an integrated development of transport system in the country.

* See Chateter 12

Chapter 7

Transport Planning and Data Base

7.1 Introduction

7.1.1 In our terms of reference we have been asked to identify areas in which data base of the transport system needs to be strengthened to promote formulation of an integrated transport plan, and to suggest methodology for framing and appraising such plans at the Central, State, district and block levels. There is no doubt that in the absence of up-to-date and reliable data, the process of planning in tiansport is seriously inhibited, and our main focus here is to recommend measures for collecting essential information regularly and systematically. But as the question of methodology for transport planning and appraisal, in our view, is primarily a technical, not a policy issue, we present only a brief overview of some of the recent developments in this area as an aid to decision-making process.

7.2.2 As in any other sector transport planning is a continuous process which calls for constant effort on the part of planners to forecast transport demands, allocate projected traffic between modes, frame appropriate investment options and conduct cost-benefit appraisal within a broad policy frame, so that new ideas and procedures are developed and old ones refined or discarded.

7.2 Transport Planning

7.2.1 An integral part of the macro-economic plannlng process, transport planning involves inter-related steps, in which transport is linked with other sectors of the economy and adjustments made in capacities of transport system in close conformity with requirements of other sectors. A properly integrated transport plan should take into acount Interaction between land use and transport, and its inter-modal mix based on comparative resource cost of different modes of transport. Only then can capacities created in transport agencies in aggregate as well as separately be such as to meet the country's requirements at a minimum cost to society.

Macro-economic Model

7.2.2 At present, demand forecasts for the transport sector, including inter-modal allocation of traffic between rail and road, are initially worked out by the Planning Commission's Perspective Planning Division (PPD) on the basis of a multi-sectoral, consistency model. This includes a macro-economic, input-output, and consumption sub-models. In the consumption sub-model, demand elasticities for consumption items are estimated. This process ensures that the projected final demand not only incorporates planners' preferences for consumption but also makes allowances for those of consumers. For transport, computation of final consumption takes into account consumer expenditure on passenger travel and transport margins incorporated in the cost of final consumption goods.

7.2.3 PPD's long-range planning model thus gives sectoral output forecasts required to meet inter-industry and final consumer demands. These forecasts, at first worked out in value terms, are later translated into physical targets by using an appropriate index. The targets for freight traffic are given in terms of originating tonnage, and are subsequently converted into tonne-kilometres by using rail co-efficients. The figures so derived are cross-checked for selected fommodities by using material balances method. passenger traffic demand is projected by trened method.

7.2.4 PPD's macro-economic model is calibrated at the level of national aggregates only. No account is taken of the effect on traffic leads of likely change in the spatial distribution of production or consumption. The lead of traffic used for translating originating tonnage into tonne-kilometres is not determined endogenously in PPD's model,

but is taken exogenously from base-year data of railways' observed leads. Further, in allocating projected freight traffic demand for modes of transport, no consideration is given to comparative cost of movement by different modes.

7.2.5 The spatial dimension of transport demand cannot be incorporated into the macro-economic planning process unless a regional activity allocation model is developed. Such a model is useful for bringing about balanced regional and urban development. The technical aspect of an activity allocation model and its applications for transport policy planning are discussed in technical papers produced by the Transport Policy Planning Project.

Transport Model

7.2.6 A comprehensive transport planning model produces forecasts of passenger and freight demand flows, as well as activity allocation patterns, which are an integral part of macro-economic planning process.

7.2.7 Transport planning model consists of six distinct though inter-dependent stages. These may be summarized as follows :—

(i) development of multi-regional and multi-sectoral macro-economic model, which provides regional allocation of sectoral outputs for the forecasting year;

(ii) inter-regional optimisation of commodity flows based on forecasts of regional demands and capacities provided by step (i);

(iii) construction and simulation of transport network;

(iv) optimal allocation of traffic to alternative modes;

(v) network assignment to achieve equilibrium flows; and

(vi) specification and evaluation of alternative transport policy options.

Each of these stages requires development of proper methodology, and collection and calibration of relevant data on a number of variables.

7.3 Data Base

7.3.1 In our discussion on inter-modal mix and transport planning, the need for three sets of key data have emerged. These relate to (i) traffic flows; (ii) resource cost of transport services; and (iii) economic base of an area and its land-use pattern. Furthermore, there are some important deficiencies of essential data relating to specific modes in respect of both their infra-structural and operational aspects that must also be removed.

Traffic Flows

7.3.2 Comprehensive data on traffic flows by different modes of transport are essential for operational and planning purposes. Gaps in data relating to interregional commoddity flows are far more serious in relation to road and inland water transport than for rail, coastal shipping and air transport. Data on movement of commodities by rail are available in statistical supplements to the annual reports of the railways. This provides information on movement of principal commodities by gauge and zonal railways in terms of originating tonnage, net tonne-kilometres and average lead. Further, detailed information on movement of over 500 selected commodities is also available in computerised freight invoices maintained by each zonal railway. Similarly, information on freight traffic carried by air and coastal shipping is available with airlines and shipping companies respectively. Information on coastal shipping is also maintained by D.G. (Shipping) and is published by the Directorate of Transport Research. However, for road transport because of multiplicity of transport agencies, preponderance of single vehicle operators and absence of traffic recording and reporting procedures, systematic information on traffic flows is not available. This is also the position for data on inland water transport.

7.3.3 To collect information on commodity flows by road, the Committee on Transport Policy and Co-ordination organised for the first time in 1959, road traffic surveys on six trunk routes. In 1963, the Ministry of Transport undertook further traffic surveys and extended the coverage to 16 long distance trunk routes. The Joint Technical Group for Transport Planning (JTG) in the Planning Commission studied movement of 15 major commodities by all modes at the same

time. Along with JTG the Planning Commission instituted regional transport surveys, which yielded considerable volume of information on commodity flows by different modes of transport within each region. These studies and surveys were later discontinued, and thereafter no attempt was made to collect information on commodity flows. The Planning Commission, however, realised the need for such information for policy planning and investment in transport and accordingly it commissioneed RITES to undertake a study on traffic flows as part of the Transport Policy Planning Project. The study was designed to estimate inter-regional commodity flows for the three major transport modes, namely, railways, roads and coastal shipping. Information was collected for 37 commodities, the level of disaggregation selected for generating inter-regional flows being a revenue district. The findings of this study have been used widely in our report.

7.3.4 Equally important is information on travel pattern of passengers. There is need to collect information on a sample basis for intercity traffic both as between mofussil towns and between a metropolitan city and a mofussil town, as only information on the travel pattern for a few selected metropolitan cities is available at present in transportation and land-use studies. Information has been collected recently on passenger profiles by Rail Traffic Enquiry Committee.

Transport Costs

7.3.5 The need for collection and publication of information on transport costs was highlighted by the Committee on Transport Policy and Co-ordination (CTPC). But to-date very little has been done in this direction. The Ministry of Railways have a small cell within the Directorate of Statistics in the Railway Board for the study of costs. However, the studies carried by this cell are only intended to provide estimates of financial costs to enable the Railways to assess the viability of their different operations. These estimates are not useful for comparing the cost advantage of railways vis-a-vis other modes of transport. The Directorate of Transport Research in the Ministry of Transport and Shipping has so far not shown any interest in studying transport costs. Hence, apart from the railways, there is no data available even on the financial costs of other modes of transport.

7.3.6 The importance of collecting reliable data on transport costs for investment and pricing decisions in the transport sector was realised for a long time. Availability of such data makes it possible to design and calibrate transport models at the macro-economic planning level, apart from appraising the economic justification of individual transport projects, It is for this reason that the Planning Commission had commissioned RITES to study resource costs of rail, road and coastal shipping on a comparable basis. The determination of our inter-modal mix in Chapter 3 was based on resource cost data provided in this study.

7.3.7 In our view information on traffic flows and resource costs of different modes of transport is important for the development of an efficient transport system. We suggest that information on traffic flows and resource costs on the lines compiled by RITES should be periodically collected, preferably once in every five years. Periodical collection of such data will be useful for keeping developments in the spatial pattern and composition of traffic flows as also in comparative resource costs of different transport modes under constant review. It may be recalled* that one of the tasks assigned to National Transport Commission is to study traffic flows and resource costs in order to frame correct policy on inter-modal mix from time to time. This Commission, therefore, will be the right forum to collect and analyse this information.

7.3.8 Apart from data on traffic flows and resource costs, there is also a need for collecting information specific to individual modes on a regular basis. For example, very little information is available on operation of road transport, particularly in the private sector. Similarly, no up-to-date data is available on the number of non-mechanised vehicles operating in urban areas, particularly in metropolitan cities. Statutory registration of non-mechanised vehicles has been tried at a number of places earlier without convincing results, as this is beset with administrative problems. Voluntary registration may also not yield satisfactory results, as the extent of coverage will always be doubtful. In this situation, it may be desirable to assemble such data through national surveys which collect information at the household level in urban areas.

* See Chapter 6.

Roads

7.3.9 Since 1950-51 the Ministry of Shipping and Transport has been bringing out an annual publication entitled Basic Road Statistics. This compilation gives in detail road statistics for different categories and types of roads, and bridges. In 1963 the Ministry created a special Directorate of Transport Research to carry out research studies and collect transport statistics at the national level. As a result of continuous effort, the coverage of Basic Road Statistics has been improved. Besides compilation of detailed road and bridge statistics, comprehensive data are assembled in it on organisation and administration of roads and bridges in India, inputs and machinery, road users and traffic densities, Government expenditure on roads and road development under Five Year Plans, decennial growth of rural and urban population, State-wise distribution of villages and towns by population, and distances of villages from nearest road network.

7.3.10 Although data collection for roads has thus been improved considerably, there are a few areas where further effort is called for. First, a detailed inventory of various categories of roads and bridges, except for national highways, is not available on an all-India basis. Roads, other than national highways, being a State subject, there are as many as 350 agencies responsible for construction and maintenance of roads with no single agency co-ordinating their activities. This creates problems for collection of data on roads in a systematic manner. Not only is there absence of complete inventory of roads, data on road length by characteristics is also not compiled at district or State levels. We suggest that chief engineers (road) at the State level be entrusted with collection and compilation of data for all categories of roads, which may later be compiled and co-ordinated at the national level by the Directorate of Transport Research. Secondly, traffic density data is not collected for major roads, except for national highways for which regular density data is collected through "traffic count" surveys. Data on traffic densities needs to be collected for all major roads on a regular basis. We suggest that the scope of "traffic count" surveys be widened by including State highways and important major district roads. This work may also be entrusted to State PWD traffic engineering cells. Thirdly, data on costs of construction and maintenance of various types of roads is not available. This data will have to be collected through case studies. Fourthly, there is scanty information about the socio-economic impact of construction of rural roads. We understand that the Ministry of Shipping and Transport is contemplating to initiate studies in this area. This has our full support. Lastly, we may also point out that there is considerable time lag in the publication of data on roads. We urge that delays in publication of data should be avoided.

Road Transport

7.3.11 The Ministry of Shipping and Transport publishes annually detailed information on motor vehicles registered in different States in the Motor Transport Statistics. This also includes information on motor vehicle production, registration, taxation and accidents. Detailed information on State transport undertakings is published in the Quarterly Performance of Public Sector Road Transport undertakings. This publication gives information regarding management, operation, fleet capacity, output, financial performance and costs for various State transport undertakings. Besides reviewing the work of public sector transport undertakings, the Ministry compiles information on passenger traffic carried by these undertakings in terms of passenger-km and vehicle-km, etc. This data is compiled on a monthly basis.

7.3.12 Despite statutory registration of vehicles and regulatory control in operations, very little information is compiled and published on vehicle characteristics, particularly of goods carriers, their ownership and nature of operations. There is also complete absence of data regarding the output of goods vehicles in terms of tonnes carried and tonne-kilometres performed. An analysis of stock of vehicles is also made difficult because of lapses in their registration. Further, information on road accidents does not provide full coverage of the number and type of accidents and the nature of casualties. Finally, as in the case of road statistics there is also time lag of two to three years in publication of statistics on road transport.

7.3.13 Registration records of vehicles maintain information on important aspects of motor

vehicles, such as make, model, year of manufacture, engine horsepower, number of cylinders and unladen weight. The permit or right of operation records also carry information on carriers' licence. These statistics are neither compiled nor published.

7.3.14 Similarly, practically nothing is known about the pattern of ownership of goods vehicles, particularly in the private sector which accounts for the ownership of most of these vehicles. Capital investment in goods vehicles accounts for considerable part of total capital formation in the transport sector. It is not known which group of operators are making investments in these vehicles and how these investments are financed. For example, it is useful to know to what extent purchase of trucks is financed through institutional sources, particularly public sector banks and to what extent through private savings. We have also no information about stock of vehicles held by different operators by size groups or form of ownership. It would be useful to publish data on the number of private and public carriers by size and type of ownership. Lack of census of road haulage is indeed a conspicuous gap in national statistics. To obtain a picture of industry we suggest that a census of road haulage should be carried out at regular intervals, which will cover form of ownership, number of operators, vehicle fleet analysed by age, carrying capacity and type of permit.

Railways

7.3.15 The railways publish voluminous data on their plant and equipment, operations and utilisation of assets, traffic handled, fuel consumed and financial performance in their annual publications. The Indian Railways year book, annual reports and accounts and annual statistical statements are their main publications. While commodity flow data are compiled by the zonal railways, this information is not published, nor about movement of passengers between selected pairs of points. Data on costs are published giving overall average costs for different gauges and for different zonal railways but commodity-wise cost data, although compiled, are not published.

7.3.16 The railways have been increasingly using electronic data processing systems with second generation computers in every zonal system for compilation of data. It is understood that they are contemplating to enlarge the scope of electronic data systems for wagon control and other operations as well.

7.3.17 The data available on cost and commodity flows through railway publications are not in the form in which they can be used directly for transport planning. The study conducted by RITES has provided methodology for computation of data for this purpose. It will be useful if the railways analyses cost and flow data on these lines.

Metropolitan Transport

7.3.18 Long-term transportation planning for a metropolitan region requires comprehensive surveys and careful analysis of data on present demand and supply of transport facilities and projected growth of urban area, land-use, population, economic activities and traffic flows. Such comprehensive traffic studies have so far been conducted only for the four metropolitan cities of Calcutta, Bombay, Delhi and Madras. Lack of basic data on various aspects is a serious constraint in identifying problems and determining long-term transportation requirements of metropolitan cities. For medium and small size cities, data on traffic demand, nature and pattern of computer movement and supply of transport facilities are not at all available, and whatever facilities are provided these are haphazard, ad hoc and unrelated to traffic requirements. We have recommended* that for all metropolitan cities, with a population of 10 lakhs and above, comprehensive traffic and transportation studies should be conducted. For medium and small size cities, there is need for organisation of traffic cells by State Governments for conducting surveys for all cities with a population of and above one lakh.

Air Transport

7.3.19 A detailed study on passengers and goods carried on scheduled air services, load factors, operating costs, revenues earned, fleet and other operational statistics are available in the Basic Statistics of Air Transport in India, published annually by the Civil Aviation Department. The Airlines time table is another important

* See Chapter 12.

source of information. The annual reports of the Airlines also contain useful statistical information, while data on traffic flows on different routes and cost of operation are maintained by it, though they are not published at present. IAAI* also publishes an annual report which gives information of its financial performance and details of passenger and cargo traffic handled at international airports.

Ports and Shipping

7.3.20 Statistical data relating to major ports are published annually by Ministry of Shipping and Transport in its publication Ports and Shipping Statistics. This includes data on traffic handled, labour, finances, port facilities, equipment, origin and destination of export-import traffic. In addition, daily trade returns of customs, which contain information on the names of shipper and ship, countries of origin and destination, cargo values are compiled by the office of the Director General of Commercial Intelligence and Statistics, Calcutta. Further, each of the major ports has a special planning and statistical cell for collection and compilation of port statistics.

Inland Water Transport

7.3.21 Since 1970-71, Ministry of Shipping and Transport has been publishing statistics about Inland Water Transport in the publication, "Statistics of Inland Water Transport Industry". The publication gives information regarding navigable length of inland waterways, fleet of public sector undertakings and fleet of large private operators and operational details of public sector undertakings.

7.3.22 But practically no data are available on the number of country boats. For mechanised crafts certain details are available in registration records but these do not specify the nature and size of their operations. We recommend that periodical census of IWT vessels and operations should be undertaken. This may be entrusted to the proposed Inland Waterways Authority.

7.4 Project Appraisal

7.4.1 As investment projects in the transport sector invariably require a sizeable outlay of public expenditure, the need for appraising projects by applying a correct cost-benefit methodology hardly needs to be underscored.

7.4.2 In general, transport investment proposals fall into two broad categories, namely, those involving (a) development of basic transport infrastructure, such as major roads, railway lines, ports and so on, particularly in the regional context; and (b) specific investments for removal of bottlenecks, particularly in urban areas. Due to their technical indivisibility, projects in both categories usually require expenditure of public outlay on a large scale. But while costs and benefits of projects in the latter category can be generally attributed to prospective service users and are, therefore, measured in terms of expected earnings of the operator or reduction in users' costs, those associated with the former cannot be properly quantified. To appraise transport projects meaningfully, a national income framework (general equilibrium analysis) is necessary, as their beneficiaries are not only direct service users but also a larger spectrum of non-users. Social cost-benefit analysis is an approximation in this direction. By contrast, investment projects for removal of bottlenecks can be assessed by application of conventional user cost-benefit criteria, provided costs and benefits accruing both to operators and users can correctly be quantified and evaluated. It is also necessary to distinguish between investment in track facilities and of rolling stock. Investment in the latter is divisible and hence benefits and costs are readily quantified within user cost benefit framework. Investment in track facilities, however, require broader national income framework for carrying out a correct appraisal of a project.

Existing Procedure

7.4.3 The ordinary financial appraisal criteria take into account costs and benefits of a project as they accrue to the operator, that is, changes in the outlays and receipts of the enterprise in question. Under this procedure rates of return on capital outlay for the first year and at selected intervals thereafter are calculated. The method followed by railways requires a return of at least 6.75 per cent on capital investment in the sixth year of operation of the project. The format adopted in other Central Goverment projects is similar to that of "discounted cash flow" (DCF), under

* International Airports Authority of India.

which a project is justified if it earns a predetermined internal rate of return (IRR), that is, a rate at which the discounted or present value of costs equals the discounted value of benefits.

7.4.4 Guidelines for appraising metropolitan railway projects are under consideration in the Projects Appraisal Division of the Planning Commission. These guidelines indicate the type of information needed in feasibility reports for appraising the proposal and determining its economic viability. The feasibility report presents one of the investment options considered by the project authority in its corporate planning. As this option forms part of a larger plan, the feasibility report details all the options considered by the authority at the project formulation stage. Information is sought on a number of technical, socio-economic, financial and commercial aspect to determine whether :—

(a) specification of technical parameters is realistic or optimal;

(b) the project is worthwhile from the point of view of society as a whole;

(c) financial costs and returns are properly calculated and the project is financially viable; and

(d) organisational structure and marketing plans, including fare structures, are soundly conceived.

The guidelines do not deal with the methods used to collect ot assess the required data nor those used for appraisal of the project.

Suggested Improvement in Appraisal Methodology

7.4.5 The project appraisal division guidelines are fairly comprehensive for preparation of economic feasibility reports on urban transport project but they will have to be modified and further refined before their application to appraisal of projects in other sectors of transport. Further, this methodology is useful only for specific projects, the impact of which can be assessed in a user cost-benefit setting, but it does not provide any guidelines for evaluation of projects having a wider impact on urban or regional development.* Nor does it indicate any methodology for attaching value to such factors as time savings, comfort and convenience, accidents costs and environmental effects, which are associated with transport investments. PAD has been involved in appraisal of road projects taking into account the benefits in terms of vehicular cost and time savings. However, so far PAD has not been associated with rail investment appraisals, except in a few special cases. It is necessary to strengthen PAD's appraisal methodology in some respects, as is indicated below ;—

7.4.6 1) First of all, the objectives of a project should be clearly stated at the outset. A major difference between private and public investment decision is the nature of beneficiaries. The profit maximising firm is much more likely to have a unique goal with relatively little conflict of aims but the society as a whole includes people with disparate interests. The appraisal methodology should clearly take into account conflicting social objectives, as the method of valuation differs according to the nature of objectives or constraints underlying a project.

7.4.7. Secondly, it is important to see if theproject has emerged as part of a larger regional or urban area development plan, or it is an isolated, specific one to deal with transport bottlenecks. The forecasting methodolgy will naturally differ in the two cases. In the first case, traffic forecasts are made within a broader national income framework by assessing the impact on regional incomes, land-use patterns and industrial locations. In the second case, focus of attention is on predicting frequency of trips and their modal splits. The conventional procedure measures benefits for three distinct traffic elements, namely, (a) secular traffic generated, irrespective of the project; (b) diverted flow or traffic shifted from other substitute modes; and (c) generated traffic, resulting from reduced transport costs following the location of a project. PAD's guidelines provide a methodology for measuring these benefit but not when they effect the welfare of non-users.

7.4.8 Thirdly, every transport Investment proposal influence income distribution. though these are usually ignored in cost-benefit analysis. The ultimate decision is usually political, but if a political decision should take account of social equity of investment, the project appraisal should

*A methodology was evolved and applied by a Committee set up by the Planning Commission for evaluating railway proposals in the north eastern region (January 1979)

indicate the likely distributional consequences of investment.

7.4.9 Fourthly, most transport projects have environmental effects, such as noise, pollution or visual intrusion. The appraisal methodology should consider these factors, though this raises problems of quantification. However, in our view it is necesary to incorporate them into cost-benefit calculations to safeguard environment.

7.4.10 Fifthly, the number of road accidents per vehicle-km is higher in Asian cities, including cities in India, than elsewhere in the world. As accident costs to society have reached significant levels in relation to gross domestic product and transport usage increases them, these costs may be expected to rise in proportion to GDP, unless positive steps are taken to avert and minimise accidents. Accident valuation figures involve attribution of values to human life and estimates for losses due to incapacity arising out of an injury. This is again a difficult methodological issue but, in view of growth of accidents in transportation, procedures need to be developed for incorporating these costs in the appraisal process, so that projects which are likely to reduce accident incidence receive preference.

7.5 Summing Up

7.5.1 Transport planning requires development of a systematic methodology for projecting traffic demand and its allocation on the basis of resource costs of different modes of transport. The development of an appropriate methodology for transport planning is, however, a technical, not a policy, issue. Continuous research will be required on these aspects to improve reliability of traffic forecasts. We recommend that the proposed National Transport Commission should encourage research on methodology of transport planning and appraisal.

7.5.2 The methodology and framework evolved by RITES for computation of resource costs and compilation of traffic flows are, in our view, in the right direction. We recommend that (information on traffic flows and resource costs should be periodically collected, preferably once in every five years, so that developments in the spatial pattern and composition of traffic as also in comparative resource costs of transport may be kept under constant review.) The National Transport Commission should encourage studies on these aspects of transport data.

7.5.3 Transport projects generally involve large scale investments and generate considerable amount of secondary and non-user benefits which cannot be quantified in terms of expected earnings of transport undertakings. There is also the complex problem of quantification of social costs such as pollution, environmental effects, accidents costs, and other intangibles. These costs and benefits cannot be properly assessed by applying financial feasibility criteria. Their assessment requires a broader frame of social-cost benefit analysis. We recommend that transport projects in future should be appraised within such a wider framework. The present appraisal methodology adopted by Project Appraisal Division is satisfactory for road investment projects but it needs to be strengthened for projects in rail, port and other sectors of transport which involve large-scale investments having wider repercussions on the economy. We have suggested some areas where PAD may strengthen its appraisal procedure.

Chapter 8

Transport Research and Training

8.1 A Review

8.1.1 Training, research and development have a vital role in the evolution of an efficient transport system. The importance of trained personnel to manage the transport system efficiently can hardly be overstated. There is also a need for trained staff to undertake transportation planning and investment studies to improve the quality of traffic projections and project appraisals.

8.1.2 Training and research in transport have not received adequate attention. The need for devoting greater attention to development of training and research facilities in transport has been highlighted in representations made to us. While some facilities exist for specialised training, these are by no means commensurate with the immense magnitude of effort involved in operating the transport system at optimal levels in the country. We first review the existing facilities in various modes and then make suggestions for improvement.

Railways

8.1.3 The Railways Research, Designs and Standards Organisation (RDSO) Lucknow, set up in 1957, functions as a technical adviser and consultant to the Railway Board, zonal railways, railways production units and public and private undertakings for designs and standardisation of railway equipment. Today a unique organisation amongst railway research institutions of the world, the guidelines for its research and development activities are laid down by the Central Board of Railway Research, consisting of eminent scientists, engineers, technologists, managers, educationists and senior executives from other research organisations, universities and industries, interested in railway technology, materials and equipment.

8.1.4 *The Railway Staff College*, Vadodara, opened in 1952, provides courses in foundation—orientation, re-orientation and special courses. The foundation courses impart basic knowledge and skills to those joining the railways as probationary officers. The re-orientation courses aim at upgrading knowledge of middle and senior level officers having 5 to 10 years' experience, and equipping them with managerial decision-making ability for higher positions. The principal subjects covered in the course include transportation, commercial, financial accounts and personnel management, civil, mechanical, electrical, signalling and telecommunication engineering, stores, sales. planning and forecasting, and market research. Special courses on work study and operation research, cybernetics and computer application, discounted cash flow, CPM and PERT, network analysis, inventory control are also organised.

8.1.5 *The Railways Institute of Advanced Track Technology*, Pune, set up in 1959, caters to training needs of civil engineers of the Indian railways, and turns out track engineers grounded in latest technology and with confidence in its application.

8.1.6 *The Railways Institute of Mechanical and Electrical Engineering*, Jamalpur, established in 1924, provides several training courses in diesel operations for serving officers of Indian railways and for fuel-economy for loco-supervisers.

8.1.7 *The Railways Institute of Signal Engineering and Telecommunications*, Secunderabad, set up in 1957, provides intensive and advanced training in the theory and practice of railway signal engineering and telecommunications.

8.1.8 Considering the magnitude of investment in railways. the existing training facilities in planning and management are not adequate. We feel that it is necessary to augment training facilities and enlarge their scope, specially in regard to modern management techniques, investment planning, evaluation and monitoring.

Roads and Road Transport

8.1.9 The Transport Research Division of the Ministry of Shipping and Transport is primarily responsible for organizing and analysing economic and statistical intelligence and for offering relevant advice to its operational wings. It compiles, analyses and periodically publishes statistics relating to road, road transport, inland water transport and ports and shipping. It also undertake economic appraisal of transport projects referred to it and arranges for surveys on movement of goods and passengers by various modes in collaboration with the Central Statistical Organisation and National Sample Survey Organisation of the Department of Statistics. The Division is, however, not technically fully equipped to undertake these studies. including comprehensive traffic surveys. Consequently, there are deficiencies in essential data required for transport planning.*

8.1.10 *The Central Road Research Institute* (*CRRI*,) the premier highway engineering research organisation located in New Delhi, has been functioning since 1952 under the Council of Scientific and Industrial Research as one of its national laboratories.** The activities of the Institute encompass research in highway engineering in all its varied aspects, including road traffic safety and transportation. The functions of CRRI are organised in eight research divisions manned by specialised research and testing staff. It is also equipped for research in various fields of highway engineering, such as soil engineering, concrete and bitumen technology, bridge engineering, test-track construction, operational research on highway engineering techniques, and traffic engineering and transportation.

8.1.11. The principal objectives of CRRI are to :

1. carry out research on design, construction and maintenance of roads and bridgs for different environmental conditions,
2. conduct research on all aspect of traffic and transportation engineering,
3. render technical consultancy services and advice to user organisations, and
4. disseminate research information to highway engineers through publications, refresher courses, workshops and training.

8.1.12 We understand that CRRI has experienced difficulties in its research work. Lack of funds has made it difficult to acquire essential instruments which were necessary to conduct its specialised research. Further the gestation period involved between development of a process in the laboratory and its application in the field has been too long. We recommend that R&D effort of the Institute should be suitably strenghthened by providing necessary financial support to it. It should also be encouraged to establish regional stations to undertake research suited to local conditions.

8.1.13 *Central Institute of Road Transport* (*CIRT*), *Pune*, imparts training to officers in functional areas of transportation, namely. traffic, maintenance, materials and finance. It also lays down standards, specifications and norms for stores used by road transport industry through performance evaluation, materials analysis and testing. The activities of the Institute include engineering research, formulation of specifications research studies and surveys.

Ports

8.1.14 Very limited facilities are available for undertaking research and development in the ports sector. The *Central Water and Power Researeh Station CWPRS* is the only institution for conducting hydrographic studies. The hydraulic study department of Calcutta Port Trust undertakes studies in certain limited areas. A couple of educational institutions, namely, the Indian Institute of Technology at Madras and Bombay and the Regional Engineering College at Saurathkal also offer facilities for R & D studies in this area.

8.1.15 In the pre-independence period, the one single institution which provided facilities for training nautic and engineering merchant navy personnel was the T. S. "Dufferin", which has now been replaced by T. S. "Rajendra" Bombay. The other five institutions imparting training at present are :

1. Directorate of Marine Engineering Training, Calcutta and Bombay.

* See Chapter 7.

** Presently under the Ministry of Shipping & Transport,

2. L. B. S. Nautical & Engineering College, Bombay.

3. Training Ship "Bhadra", Calcutta.

4. Training Ship "Mekhala" Vishakhapatnam.

5. Training Ship "Naulakshi" Navalakhi.

Research and Development Work in the States

8.1.16 Highway research stations in public works departments of various States are doing useful work in testing of materials and exercising quality control over road construction. These efforts should be properly co-ordinated with other agencies and with those of CRRI.

Research and Development in Educational Institutions

8.1.17 Several educational and research institutions provide courses in transportation planning. At present only Bombay University has a chair in transport economics. The Railway Ministry had created a chair in railway economics at Delhi University ten years ago. Jawaharlal Nehru University has been promoting research and training in transport geography. Moreover, University of Roorkee, School of Planning & Architecture, New Delhi and Regional Engineering colleges at Warangal, Trichy and Surat provide courses leading to Masters Degree in transportation.

With the exception of these few attempts, transport research at university level is practically non-existent in the country. The main research activity in transport area today is at Indian Institutes of Management (IIMS) and Indian Institutes of Technology (IITS). We understand that Indian Institute of Management (IIM) Bangalore has an ambitious plan to promote research in transportation. Indian Institute of Management (IIM) at Ahmedabad is also interested in promoting training and research in transport planning. The research interests of Indian Institutes of Technology (IITs) are more specialised, most of them focusing on developing systems approach to transport problems.

8.2 Inter-disciplinary Institute in Transportation Planning and Management

8.2.1 A review of existing training and research facilities in the field of transport shows that transport studies have been comparatively neglected in the country. A few specialized institutes set up by Government within individual agencies of transport fulfil specific training and research needs of the concerned modes. However, there is no institution which can impart training to those who may have to look at transport system as a whole and plan for its future development in a co-ordinated framework or undertake studies in transport problems from a common outlook and approach. The need for establishing such institutions at the national level has been highlighted in a number of submissions made to us. We strongly support this idea and recommend that in inter-disciplinary centre be set up to stimulate applied research studies, and in transport planning and management.

8.2 2 An institute of this kind has to be multi-modal as well as inter-disciplinary in character, bringing together under a single techno-academic umbrella scientists, economists and planners, as also experts drawn from various operating agencies, so that a common approach and outlook are developed to deal with problems of transport. It must attract experts of standing and recognition to serve on its faculty to promote original research and impart first-rate training. We recommend establishment of an institute enjoying autonomy on the lines of Indian Institutes of Management or Indian Institutes of Technology.

Promotion of Transport Studies in Universities and Institutions

8.2.3 We believe that there is also urgent need for promoting training and research facilities in universities and technical and management institutions in the country. We suggest that every effort should be made to encourage training facilities at the universities and at the technical and management institutions. In addition, institutes and centres engaged in this area should be encouraged to expand their research activities through necessary financial support.

Co-ordination of Transport Research

8.2.4 Apart from the inter-disciplinary institute in transport studies we have recommended in the preceding paragraphs, there are likely to be a large number of institutions and universities in a

country of India's size which might be taking interest in promotion of different aspects of transport planning and management. There are also specialized institutes dealing with training, research and development programmes to cater to requirements of specific modes of transport. Some institutes on these lines already exist, as we have already stated ; others will, no doubt, be set up in the future, depending upon the emerging needs of various agencies of transport.

8.2.5 To ensure that the requisite facilities are developed in a planned and rational manner, we feel that it will be essential to constitute an apex body at the Centre to co-ordinate research and training effort in the transport field. We therefore recommend that a research wing should be set up within the National Transport Commission to function as a co-ordinating forum for research and development. This wing should be appropriately staffed by a group of experts representing all branches of academic and applied experience in the field of transport.

8.3 **Summing Up**

8.3.1 The existing facilities for research and training are not commensurate with the magnitude of effort involved in the transport sector. An inter-disciplinary centre in transportation studies and management should be set up to stimulate research and impart training in transport planning and management. It should enjoy autonomy.

8.3.2 Universities and technical and management institutions should be encouraged to impart training in the field of transport. Financial support should be given to them for expanding research activities.

8.3.3 A research wing should be set up within the National Transport Commission to function as a co-ordinating forum for research and development.

Chapter 9

Railways

9.1 Indian Railways – the System

9.1.1 Over 125 years old now, with a route network of nearly 60,700 kms, the Indian railway system is the principal mode of transport in the country and the world's second largest under one management. It developed as a multi-gauge system with several agencies taking up construction and operations of the railway network in the earlier years. In the southern region and to the north of the River Ganga, metre gauge was preferred, as the area was largely agricultural, with little prospect for industrial growth at that time. This was also true of certain tracks in Rajasthan and Gujarat. Several princely States which decided to build and run their own railways opted for metre and narrow gauges, which were comparatively more economical. Wherever routes were expected to develop as trunk lines or serve strategic purposes, broad gauge was adopted. The multi-gauge network, causing problems of break of gauge and transhipment, is thus rooted in history.

9.2 Growth of Network

9.2.1 The growth of route length on the Indian railways during the past 30 years of just about 7,000 kms consisted of about 5,750 kms of new lines, about 900 kms of restoration of dismantled lines and nearly 350 kms of lines taken over from private railways. While route kms have grown only by about 13 per cent, track kms have increased by about 26 per cent due to double tracking, mostly on broad gauge system. The growth of gauge-wise network and track kilometrage are shown in table 9.1.

Table 9.1

Growth of Route and Track Kilometers on Indian Railways

(kilometres)

Year	Total route	Total running track	B.G		M.G		N.G	
			Route	Running Track	Route	Running Track	Route	Running Track
1	2	3	4	5	6	7	8	9
1950-51	53,596	59,315	25,258	30,804	24,158	24,356	4,153	4,153
1955-56	55,011	60,845	25,979	31,598	24,631	24,837	4,401	4,410
1960-61	56,247	63,602	26,676	33,679	25,168	25,514	4,403	4,409
1965-66	58,465	68,375	28,571	38,049	25,523	26,014	4,305	4,312
1970-71	59,790	71,669	29,449	40,825	25,865	26,362	4,476	4,482
1975-76	60,216	74,255	30,497	43,221	25,427	26,752	4,292	4,292
1977-78	60,693	75,012	30,909	43,922	25,503	26,809	4,281	4,281

Data Source : Ministry of Railways.

9.2.2 Against a moderate growth of 13 per cent in route kilometrage during the last 30 years, passenger traffic increased more than two-and-a-half times, from 66.5 to 177 b. passenger kms and freight traffic more than three-and-a-half times, from 44 to 163 b. tonne kms. This resulted in a sharp increase in the density per route km. both on broad and metre gauges, as shown in table 9.2.

Table 9.2

Density of Traffic per Route Kilometre

(000)

Year	Broad Gauge		Metre Gauge	
	Passenger Kms. per route Km. per annum	Net tonne Kms. per route Km. per annum	Passenger Kms. per route Km. per annum	Net tonne Kms. per route Km. per annum
1	2	3	4	5
1950-51	1,765	1,502	853	245
1955-56	1,619	1,942	778	359
1960-61	2,027	2,764	887	543
1965-66	2,377	3,404	1,062	758
1970-71	2,876	3,611	1,249	806
1975-76	3,674	4,168	1,401	818
1977-78	4,377	4,547	1,572	857

9.2.3 Bulk of the traffic, both freight and passenger, is moved on broad gauge network. Although constituting only 51 per cent of total route length, broad gauge accounts for 86.4 per cent of freight tonne kms and about 76 per cent of passenger kms. Metre gauge covering about 42 per cent of the route accounts for only 13.4 per cent of freight tonne kms and 23 per cent of passenger kms. Narrow gauge, comprising about 7 per cent of network, accounts for the residual 0.2 per cent of freight and 1 per cent of passenger traffic. There are more freight than passenger train kms on broad gauge, while on metre gauge there are more passenger and less freight train kms.

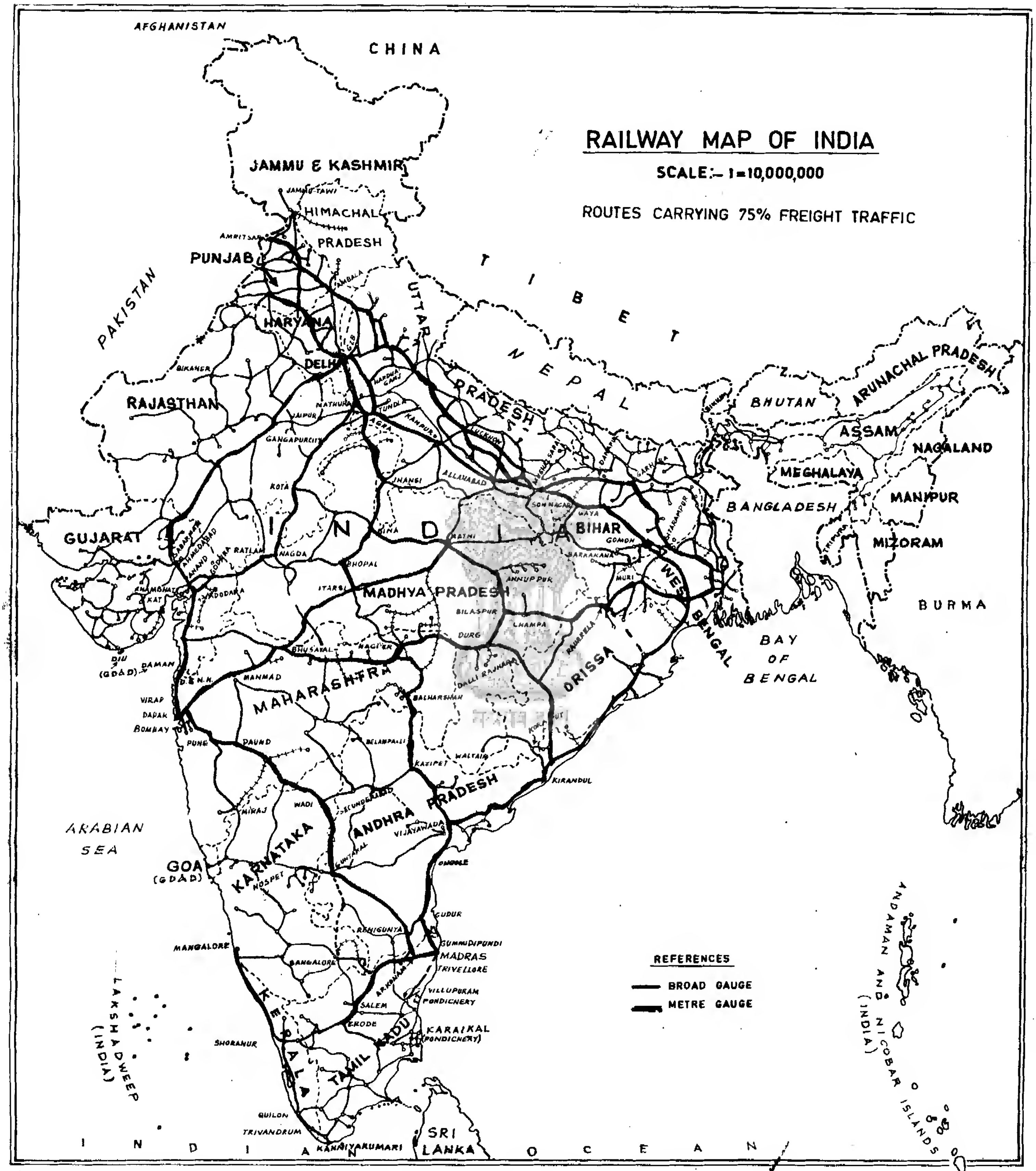
9.2.4 Traffic is concentrated in about 25 per cent of total network, accounting for 75 per cent of freight and 55 per cent of passenger traffic on a few main routes. These connect the four metropolitan cities of Bombay, Calcutta, Delhi and Madras which, together with the high mineral originating traffic sections, form the "hard core" of the system. Most routes on this limited network, nearly 33 per cent of which is under electric traction, consist of broad gauge with double lines working at near saturation levels and high traffic densities*.

9.3 Utilisation of Assets and Productivity

9.3.1 The rail system has recorded a sustained growth in creation of transport capacity since 1950-51. With the growth of traffic, the assets created have been intensively utilised, as shown in table 9.3 **

* See maps at pages 139A and 139B.

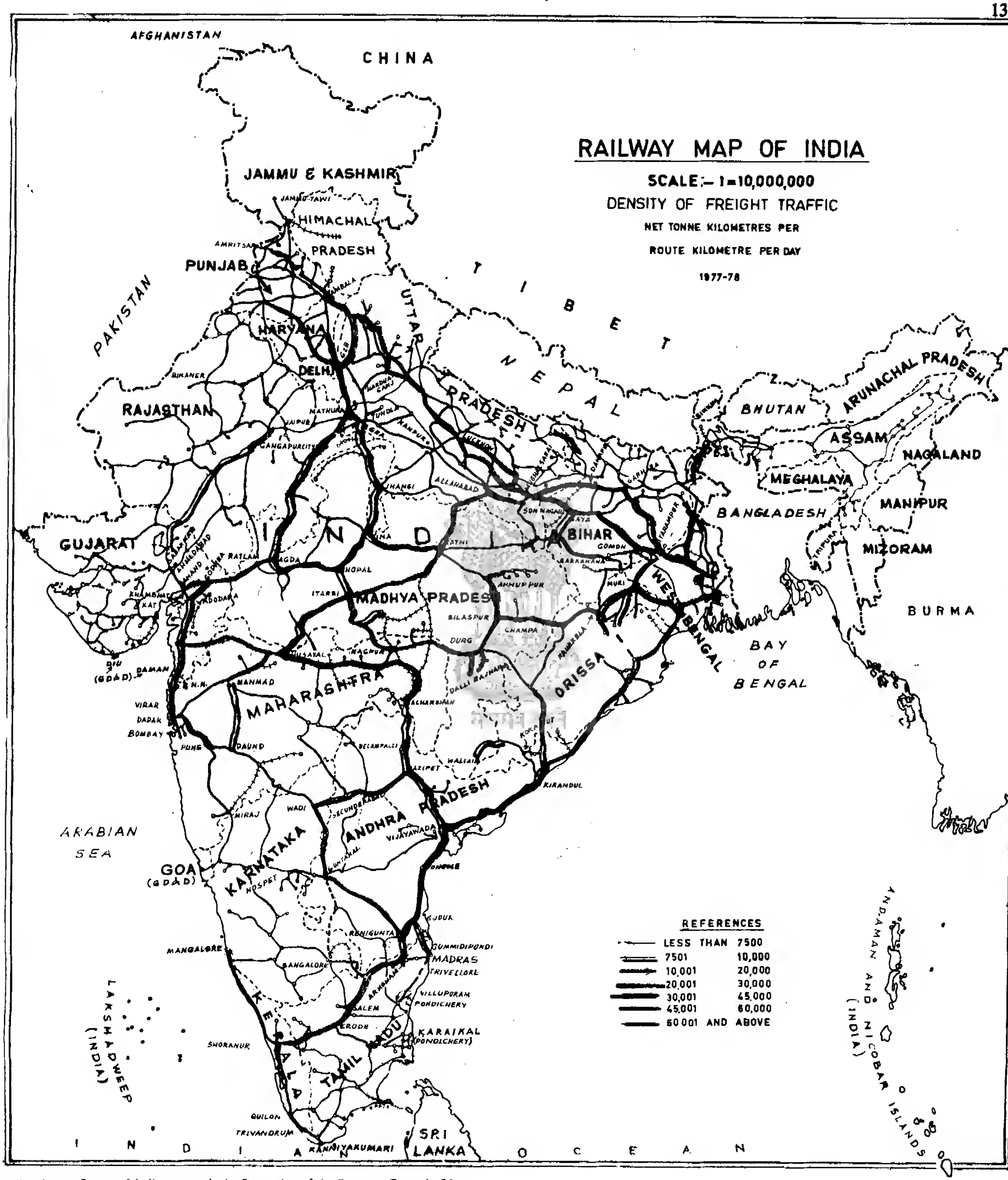
** Also see graph at page 139C.



Based upon Survey of India map with the Permission of the Surveyor General of India.

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

The boundary of Meghalaya shown on this map is as intepreted from the North-Eastern Areas (Reorganisation) Act, 1971, but has yet to be verified.


RAILWAY MAP OF INDIA
SCALE :– 1=10,000,000
DENSITY OF FREIGHT TRAFFIC
NET TONNE KILOMETRES PER
ROUTE KILOMETRE PER DAY
1977-78
REFERENCES
LESS THAN 7500
7501 10,000
10,001 20,000
20,001 30,000
30,001 45,000
45,001 60,000
60 001 AND ABOVE
AFGHANISTAN
CHINA
JAMMU & KASHMIR
HIMACHAL PRADESH
PUNJAB
PAKISTAN
HARYANA
DELHI
RAJASTHAN
UTTAR PRADESH
TIBET
NEPAL
BHUTAN
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
BANGLADESH
MIZORAM
BIHAR
GUJARAT
MADHYA PRADESH
WEST BENGAL
BURMA
BAY OF BENGAL
ORISSA
MAHARASHTRA
ANDHRA PRADESH
KARNATAKA
ARABIAN SEA
GOA (GDAD)
KERALA
TAMIL NADU
SRI LANKA
LAKSHADWEEP (INDIA)
ANDAMAN AND NICOBAR ISLANDS (INDIA)
INDIAN OCEAN
BOMBAY
MADRAS
BANGALORE
MANGALORE
PUNE
TRIVANDRUM
KANNIYAKUMARI
AMRITSAR
BIKANER
JAIPUR
MATHURA
LUCKNOW
ALLAHABAD
JHANSI
BHOPAL
ITARSI
BILASPUR
DURG
NAGPUR
MANMAD
DAUND
MIRAJ
WADI
SECUNDERABAD
VIJAYAWADA
HOSPET
RENIGUNTA
SALEM
ERODE
SHORANUR
QUILON
KARAIKAL
KIRANDUL
VIRAR
DADAR
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INDIAN RAILWAYS

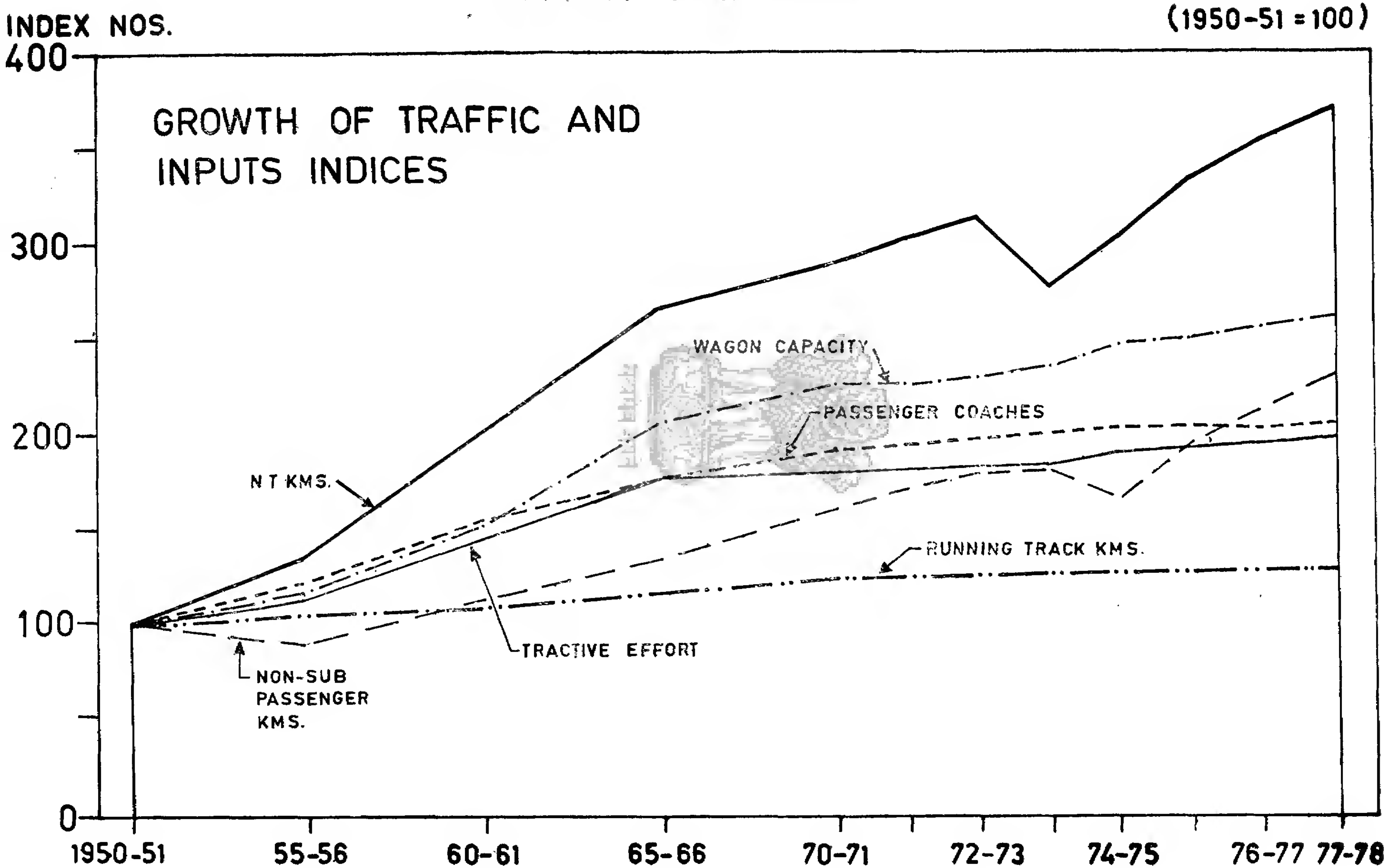

Table 9.3

Indices of Growth of Traffic and Inputs

Year	Net tonne Kms.	Wagon capacity	Nonsuburban passenger kms	Passenger coaches	Route Kms.	Running track kms.	Tractive effort @
1	2	3	4	5	6	7	8
1950-51	100	100	100	100	100	100	100
1955-56	135	118	91	122	103	103	117
1960-61	199	152	110	154	105	107	144
1965-66	265	206	132	174	109	115	175
1970-71	289	226	159	188	112	121	179
1971-72	302	226	169	191	112	123	180
1972-73	309	229	178	195	112	124	180
1973-74	277	235	179	199	112	125	181
1974-75	304	246	165	200	112	125	180
1975-76	336	249	193	201	112	125	191
1976-77	355	256	211	200	113	126	193
1977-78	369	259	229	203	113	126	199

@ Motive power available.

9.3.2 From statistical data published in the annual reports, we find that utilisation of locomotives, wagons and coaches has improved continuously. Average train load increased with running of heavier trains. and traffic density on tracks rose three times as indicated in table 9.2. Tables 9.4, 9.5 and 9.6 indicate utilisation of rail assets. The utilisation of wagons on the Indians railways compares favourably with some of the advanced railway systems of the world, as can be seen from table 9.7.

Table 9.4

Locomotive Utilisation

Year	Gross tonnes* moved per kilogram of tractive effort		Net tonne** kms. per goods train hour	
	B.G	M.G	B.G	MG
1	2	3	4	5
1950-51	1,525	1,191	8,590	2,884
1955-56	1,688	1,245	8,570	3,437
1960-61	1,864	1,444	10,808	4,232
1965-66	1,962	1,621	12,202	5,047
1970-71	2,147	1,714	13,492	5,824
1971-72	2,215	1,750	13,946	6,097
1972-73	2,254	1,789	13,938	6,337
1973-74	2.092	1,520	13,966	6,616
1974-75	1,988	1.498	14,599	6,669
1975-76	2,319	1,742	15,018	6,423
1976-77	2,420	1841	16,292	6,556
1977-78	2,472	1,825	16,447	6,611

* Includes weight of motive unit, vehicle and contents.
** Pay load only

Table 9.5

Wagon Utilisation

Year	Net tonne kms per tonne of wagon capacity		Wagon kms. per Wagon day	
	B.G	M.G	B.G	M.G
1	2	3	4	5
1950-51	11,833	9,021	62.3	50.2
1955-56	14,790	8,497	74.5	45.9
1960-61	16,558	10,125	76.9	51.6
1965-66	15,567	12,255	73.2	60.1
1970-71	15,117	12,583	33.4	58.4
1971-72	15,626	13,003	74.1	58.8
1972-73	15,717	13,225	74.4	60.0
1973-74	13,950	11,574	67.2	50.8
1974-75	15,186	11,876	70.3	53.7
1975-76	15,412	12,313	76.8	56.4
1976-77	16,754	12,843	81.1	58.1
1977-78	17,259	12,764	81.9	57.5

Table 9.6

Average Train Load

(Tonnes)

Year	Net load		Gross load (including weight of engine)	
	B.G	M.G	B.G	M.G
1	2	3	4	5
1950-51	489	185	1,068	435
1955-56	537	246	1,146	537
1960-61	656	298	1,354	648
1965-66	725	347	1,470	716
1970-71	737	378	1,507	753
1971-72	748	391	1,518	768
1972-73	763	403	1,539	783
1973-74	745	408	1,528	785
1974-75	778	422	1,563	800
1975-76	782	413	1,577	800
1976-77	796	413	1,607	785
1977-78	818	423	1,638	800

Table 9.7

Wagon Utilisation In Some Other Countries

Sl No.	Railway	Wagon Kms. per wagon day	Nt. Kms. per tonne of wagon capacity
1	2	3	4
1.	French National Railways	56.9	7,588
2.	German Federal Railways	59.6	6,917
3.	Italian State Railways	58.8	5,487
4.	Japanese National Railways	92.4	22,800
5.	U.S.Class I Rail roads	81.7	12,253
6.	Indian Railways (B.G)	81.9	17,259

(Data for foreign railway systems have been taken from the *International Railway Statistics*, 1974. Data for Indian Railways pertains to 1977-78.)

9.4 Capacity on the System

9.4.1 The carrying capacity being a function of tonnage and distance, the tonnage that can be lifted will depend upon the lead of traffic. For a given holding of locomotives and freight wagons, it is possible to make a fairly reasonable assessment of the tonne kms that can be transported by rail. While the transport capacity of the system can be quantified in terms of its moveable asset of rolling stock, the line capacity of the system unlike the rolling stock cannot be transferred from one route to the other and thus cannot be quantified in global terms. Moreover, the line capacity is used both by passenger and freight services and, therefore, the capacity would depend on the mix of each. Ground capacity is, however, measured for specific sections and routes to assess the inputs required for meeting demand of traffic. A careful study is necessary to assess ground capacities on various sections to meet anticipated traffic levels and avoid bottlenecks in future.

9.5 Passenger Traffic-Composition and Growth

9.5.1 The passenger traffic on railways is classified as suburban and non-suburban. In non-suburban category there are two further classifications-long distance passenger traffiic handled by mail and express trains and short distance passenger traffic by stopping passenger trains. A journery of more than 300 kms could be categorised as long distance passenger traffic. On Indian railways long distance passenger traffic has grown at an average annual rate of about 7 to 8 per cent during the past few years, against a growth rate of about 4 per cent for short distance traffic. Suburban traffic has grown substantially in metropolitan cities of Bombay, Calcutta and Madras, the growth of this category of traffic being almost six times during the last 30 years. Presently the annual growth rate of suburban traffic is about 10 to 11 per cent. Nearly 97 per cent of total non-suburban passenger traffic is accounted for by second class travel. Table 9.8 gives details of the composition and growth of passenger traffic since 1950-51.

Table 9.8

Total Passenger Kilometres on Railways

(In million)

Year	Suburban (all classes)	Non-Suburban: First class	Total* Upper Class	Second Mail/ Express	Second Ordy.	Total non-sub-urban	Grand Total
1	2	3	4	5	6	7	8
1950-51	6,551	1,344	3,790	12,537	43,639	59,966	66,517
1955-56	8,127	1,014	2,973	15,660	35,640	54,273	62,400
1960-61	11,770	1,444	3,454	22,251	40,190	65,895	77,665
1965-66	17,164	1,961	4,220	28,997	45,913	79,130	96,294
1970-71	22,984	2,214	4,394	37,856	52,886	95,136	118,120
1971-72	24,250	2,337	4,644	41,484	54,951	101,079	125,329
1972-73	26,596	2,439	4,774	45,804	56,353	106,931	133,527
1973-74	28,037	2,672	4,328	49,642	53,657	107,627	135,664
1974-75	27,157	2,660	3,190	46,154	49,753	99,097	126,254
1975-76	32,862	2,893	3,421	54,140	58,338	115,899	148,761
1976-77	37,082	3,021	3,628	57,071	65,395	126,754	163,836
1977-78	39,433	3,235	3,977	65,492	67,802	137,271	176,704

*Includes old second class which was abolished in 1974.

9.5.2 The average lead of passenger traffic has been increasing steadily, except the lead of non-suburban ordinary traffic. The lead of upper class passenger traffic increased sharply from 151.6 to 512.7 kms between 1951 and 1978. The lead of second class mail and express traffic has also increased from 241.1 to 313.8 kms in these years. Details of increase in year-wise leads are given in table 9.9.

Table 9.9

Average Distance Travelled by Passenger

(In kilometres)

Year	Suburban (all classes)	Non-suburban: Upper	Second Mail/Express	Second Ordinary
1	2	3	4	5
1950-51	15.9	151.6	241.1	54 9
1955-56	16.4	198.2	206.1	51.7
1960-61	17.3	203.3	232.4	50.0
1965-66	16.9	248.2	232.0	49.8
1970-71	18.9	274.6	244.2	50.8
1971-72	19.0	273.2	248.4	51.0
1972-73	19.2	319.6	257.3	52.4
1973-74	19.5	389.8	264.7	52.7
1974-75	19.8	481.3	287.3	56.0
1975-76	20.1	515.5	308.7	51.9
1976-77	20.6	518.9	306.0	50.2
1977-78	20.4	512.7	313.8	49.9

9.5.3 The growth of passenger traffic on railways, especially long distance and suburban traffic has been much faster than was anticipated and provided for in the successive Five Year Plans. For instance, the Fifth Plan provided for a rate of growth of only 4 per cent per annum in non-suburban traffic, but the actual figure was about 7 per cent. For a country of the size of India and increasing travel needs of her population it is necessary to plan for a realistic growth of long distance passenger traffic, as otherwise conditions of travel will continue to remain extremely difficult. It has also to be kept in view that many more new centres of economic activity need to be created to disperse and reduce significantly the pressure of population in metropolitan cities which, in turn, will be possible only if travel facilities are available. Until now, the increase in train and vehicle kms has been lower than in passenger kms, which has led to overcrowding.

9.5.4 The utilisation of available seating capacity, both through an increase of coach kms per day as well as load factor, has been steadily increasing over the years, as can be seen from the data in table 9.10.

Table 9.10

Passenger Kms Per 1000 Seating Capacity

(In million)

Year	Broad Gauge	Metre Gauge
1	2	3
1960-61	61.2	44.4
1965-66	65.4	47.6
1970-71	71.2	52.8
1971-72	74.7	54.0
1972-73	79.2	55.2
1973-74	78.3	53.4
1974-75	71.4	49.0
1975-76	80.1	57.9
1976-77	87.3	63.3
1977-78	93.8	65.2

Interestingly, the increase in passenger kms per 1000 seating capacity in the broad gauge has been of the same order as in the case of metre gauge.

9.6 Seasonal Variation in Demand

9.6.1 There is a heavy fluctuation in demand for non-suburban traffic in the year. The demand for passenger traffic shoots up during the holidays particularly in May and June and, thereafter, from October to December, and in a short period of two to three weeks, a very high demand has to be met by running special trains. This demand, mostly for medium and long distance travel, is concentrated on main trunk lines which carry heavy traffic and suffer from serious problems of capacity. A month-wise variation in passenger kms from 1976-78 is indicated below.

Table 9.11

Non-Suburban Passenger Traffic
Passenger kms

(In million)

Month	1976	1977	1978
1	2	3	4
January	9,455.7	11,153.3	10,577.2
February	9,413.7	10,125.7	10,473.4
March	12,119.5	11,492.8	12,659.9
April	10,177.6	11,255.2	12,016.9
May	11,896.1	13,463.2	14,076.8
June	11,316.2	11,939.9	13,660.2
July	9,565.8	10,612.6	12,580.0
August	9,212.0	10,540.3	10,377.9
September	9,502.0	10,540.3	10,337.9
October	10,588.7	10,857.2	11,597.5
November	10,184.3	11,217.5	12,085.6
December	10,137.0	11,548.9	12,212.0

9.7 Suburban Traffic

9.7.1 While the term suburban traffic service applies only to electrified train systems around Bombay, Madras and Calcutta, the railways cater to commuters in Delhi and, to a lesser extent, in Secunderabad, Ahmedabad and other areas as well. The commuter traffic has been growing rapidly and available facilities are grossly inadequate to cope with the ever-rising needs. Problems of city transport, where railways have to play an important role, have been discussed elsewhere*. Here we cite a few of its features. About 73 per cent of suburban passengers commute on concessional season tickets. The average revenue per passenger km on suburban service is as low as 1.57 paise, and the loss on account of running suburban services was Rs. 25 crores in 1977-78. It needs to be examined urgently to what extent this large subsidy can be reduced by suitable revisions in suburban fare structure.

9.8 Non-suburban Short Distance Traffic

9.8.1 The growth of short distance non-suburban traffic has been comparatively slower than that of medium and long distance travel, particularly in areas where efficient road transport is available. The growth rate has been around 5 per cent in the eastern and northern zones, while it has been about 2.5 per cent in southern, central and south central zones. The northern and eastern railways serve the densely populated States of Uttar Pradesh and Bihar, where the number of buses per lakh of population is much lower than in other States. (See table 9.12). This may be one reason why ordinary travel through stopping passenger trains has been growing faster onnorthern and eastern railways. The feasibility of introducing more buses in certain States to cater to short distance traffic in our view should be explored.

9.8.2 The short distance traffic around cities like Delhi, Secunderabad, Poona and Ahmedabad has been increasing rapidly. One of the reasons for this trend is the facility of concessional season tickets. There has been a phenomenal increase in passengers with season tickets during the last three years, the number having doubled in 1975-78. This has put considerable pressure on facilities available such as track capacity, terminal arrangements and coaching stock, and we feel that a time has come when suitable measures have to be evolved to meet this traffic.

Table 9.12

Buses Per Lakh of Population In States

1.	Andhra Pradesh	17.42
2.	Assam	20.16
3.	Bihar	7.43
4.	Gujarat	26.41
5.	Haryana	18.81
6.	Himachal Pradesh	52.97
7.	Jammu & Kashmir	39.67
8.	Karnataka	30.16
9.	Kerala	33.60
10.	Madhya Pradesh	10.76
11.	Maharashtra	25.73
12.	Manipur	27.77
13.	Nagaland	35.85
14	Orissa	5.51
15.	Punjab	31.34
16.	Rajasthan	21.16
17.	Tamil Nadu	24.24
18.	Tripura	21.14
19.	Uttar Pradesh	12.73
20.	West Bengal	19.22

(Source : RITES Study on commodity flows)

9.8.3 Slow passenger train services are subsidized, the subsidy in 1977-78 amounting to Rs. 48 crores. Even from the operational viewpoint such passenger services act as a drag on long distance passenger and freight traffic. As this type of traffic for distances up to 300 kms can be handled more efficiently by road, the railways should not continue to expand these passenger

* See Chapter 12

services. The dominant role of railways should be to meet the demand for long distance passenger traffic and its capacity should be reserved for it. There are, however, exceptions to this general rule provided by pairs of important points, where traffic is extremely heavy, for instance, Lucknow-Kanpur, Delhi-Meerut, Delhi-Agra, Madras-Bangalore and Bombay-Pune, because the number of road vehicles required would be exceedingly high. In such cases railways have to take adequate steps to cater to such traffic by providing special corridors, if necessary, and meeting the demand by running fast, electric, multiple-unit trains.

9.9 Medium and Long Distance Traffic

9.9.1 Although only 17 per cent of originating traffic covers more than 80 kms, it accounts for nearly 70 per cent of passenger kms. For distances over 300 kms, rail travel is more convenient, particularly with sleeping accommodation now provided on the railways. The choice for long distance travel is generally between rail and air. A distance sector-wise break-up of traffic over 80 kms by rail and air in 1977-78 is shown in table 9.13.

Table 9.13

Distribution of Passenger Travelling over 80 kms

Sector—Distances

Railways (1977-78)

(In million)

Distance Zone (Kms)	Upper Class	Second Class	Total
1	2	3	4
81—250	1.257	169.663	170.890
251—500	1.880	60.843	62.723
501—800	0.718	23.232	23.950
801—1000	0.310	6.229	6.539
1001—1500	0.634	7.495	8.129
Over 1500	0.397	5.182	5.579

Distribution of Passenger by Sector Distance Indian Airlines (1977-78)

(In million)

Distance Zone (Kms)	Total
1	2
Upto 200	0.204
201 — 400	0.764
401 — 600	0.833
601 — 800	0.529
801 —1000	0.265
1001—1200	0.753
1201—1400	0.415
1401—1800	0.533
Total :	4.346

9.9.2 The estimated demand for non-sub-urban passenger traffic is expected to be over 300 b passenger kms by 2,000 A.D. This will require more coaching stock of improved design and more long dis ance mail and express trains to be put into service. To reduce pressure on track capacity, longer trains with 22 coaches hauled by single electric engine on electrified sections may be a solution. In these cases there has to be a revision of the policy, and more effort has to go into extension of facilities for long distance passenger traffic, like improved terminals, better booking and reservation facilities and high average speed. The policy so far adopted to provide for freight traffic in preference to passenger traffic cannot continue much longer. Long distance passenger traffic is also bound to grow, and it is not possible to shift it on to road or other modes of transport, because of economic factors governing the choice of the travelling public.

9.9.3 As both passenger and goods traffic will be growing simultaneously and on certain sections of trunk routes, conditions are already reaching a point where higher output of freight is becoming increasingly difficult and steps have to

be taken for increasing capacity, having bypasses at congested junctions and provision of alternate corridors, to avoid bottlenecks.

9.9.4 The growth of total passenger traffic by 2000 A D. is expected to be very large and unless steps are taken to identify sections of high growth and create special facilities there could be serious bottlenecks. Both from the point of view of investment as well as for carrying capacity of roads and railways, a co-ordinated effort is necessary between the road and rail systems. For this purpose, data on passenger movement between important pairs of points should be compiled and investments in appropriate modes planned

9.10 Freight Traffic

9.10.1 The rail system is the principal carrier for freight, the growth of traffic being four-fold in tonne kms for 1950-51—1977-78. Almost two-third of rail earnings are derived from freight traffic. For the size of the country and distances to be covered, due to geographical location of coal and other resources, railways in our view will have to be the principal mode of transport for goods as well as for passengers in the foreseeable future. Some relevant considerations in this regard are: industrial locations had to suit the availability of coal, minerals and other raw materials, requirements of large inputs like fertilizers for the agricultural sector and movement of foodgrains from surplus to deficit areas. All these factors result in longer leads.

9.10.2 While rail traffic has been growing at an annual rate of 4 to 5 per cent in terms of tontne kms, its share of traffic in the total volume has declined from 81 per cent in 1950-51 to 72 per cent in 1961 and appears to have now stabilised around 65 to 67 per cent. Long distance and bulk traffic is carried almost totally by the railways, while short distance traffic up to a lead of less than 350 kms moves mostly by road, especially when it is not of bulk commodities. High value items like cotton goods, fruits, dairy products, pharmaceuticals, etc, move by road even when leads are more than 350 kms. As a result the level of originating load of general goods by railways has remained more or less stationary at about 45 to 50 m. tonnes during the past few years.

9.11 Composition of Traffic

9.11.1 The composition of freight traffic has also undergone a radical change in the post 1951 era. Among the commodities carried by railways, bulk goods have had a higher growth rate. Bulk goods which constituted nearly 58 per cent of tonnage in 1950-51 now account for around 84 per cent of total revenue traffic. A break-up of traffic of important commodities like coal, steel, foodgrains, cement, fertilisers etc., over the years is given in table 9.14.

Table 9.14

Freight Traffic on Railway-Important Commodities

(In million tonnes)

Commodity	1960-61	1965-66	1970-71	1975-76	1977-78
1	2	3	4	5	6
1. Coal (revenue)	30.9	46.4	47 9	64 3	69.1
2. Coal for railways	20.1	20.3	16.4	16.4	15.1
3. Raw materials for steel plants	10.5	17.4	16.1	20.0	22.2
4. Finished steel from steel plants	3.8	6.3	6.3	7.7	9.0
5. Iron ore for export	2.6	5.2	9.8	11.3	10.6
6. Foodgrains	12.7	14.5	15.1	16.2	19.4
7. Cement	6.5	8.6	11.1	11.6	13.6
8. Mineral oils	4.7	7.5	8.9	11.7	13.0
9. Fertilisers	1.4	2.5	4 7	7.2	8.2
10. Other goods	45.8	52.7	47.4	46.3	45.5

9.11.2 Details of movement of the nine major commodities accounting for nearly 80 per cent of traffic on the railways in 1977-78 is shown in table 9.15.

Table 9.15

Relative Share of Revenue Tonnage and Tonne kms of the First 9 commodities in descending order of contribution in tonne kms in 1977-78

(In million)

Commodity	Tonnes originating	Percentage of total	Tonne Kms	Percentage of total tonne kms
1	2	3	4	5
1. Coal	69.16	32.81	40,522.00	27.00
2. Foodgrains	19.44	9.22	22,962.00	15.28
3. Iron and Steel	11.43	5.42	11,995.00	7.98
4. Iron Ore	26.30	12.48	9,898.00	6.59
5. Cement	13.60	6.45	9,200.00	6.12
6, Minerals oils	13.06	6.20	8,238.00	5.48
7. Chemical Manures	8.21	3.90	8,135.00	5.41
8. Salt	2.89	1.37	4,086.00	2.72
9. Limestone & Dolomite	9.92	4.70	2,690.00	1.79
Total :	174.01	82.55	117,756.00	78.37

9.11.3 Most of the traffic on the railways is in wagon loads, and about 2 per cent of the traffic in "smalls". Railways in the past have been encouraging wagon and train loads. Most of the bulk movement is carried out in point-to-point rakes, and the effort of railways should be towards an increase in the number of these point-to-point rakes with a view to reducing the turnround of wagons and relieving pressure on marshalling yards.

9.12 Average Lead of Traffic

9.12.1 Along with tonnage, freight traffic leads have also been increasing in respect of certain commodities. The increase in leads is due to a change in the traffic pattern, with more short distance traffic going to roads and greater distances between production and consumption centres. This is particularly so for cement. While for coal, raw materials for steel plants and iron ore for export, leads have been more or less steady, these have increased for cement, foodgrains and fertilisers. For foodgrains, the pattern has changed completely. Instead of movement from ports to hinterland, as in the past, foodgrains have now to be transported on long distances from north to the south and east. This pattern is likely to continue for some time. For fertilisers the pattern changes frequently. Since ships have to be diverted occasionally to more distance ports due to port congestion, the leads keep on fluctuating. Such situations are bound to continue, and it may not be possible to reduce the lead for these bulk commodities. Table 9.16 gives details of changes in average leads of these commodities.

Table 9.16

Average Lead of Traffic of Important Commodities on Railways

(Kms)

Year	Coal	Coal for Rlys	Raw materials for Steel Plants	Finished steel from Steel Plants	Iron Ore for Export	Food grains	Cement	Mineral Oils	Fertilisers	Total Traffic
1	2	3	4	5	6	7	8	9	10	11
1960-61	664	698	189	874	508*	760	372	544	N.A.	561
1965-66	571	779	192	821	510	808	456	598	752	576
1970-71	580	937	169	993	560	961	663	594	811	648
1975-76	586	721	200	1003	634	956	743	605	859	664
1977-78	586	734	204	1062	664	1181	676	631	991	686

* Relats to 1962-63.

9.13 Rail Share of Traffic

9.13.1 With the need for energy conservation a new dimension has now been added to the transport problems. Railways happen to be an energy-efficient mode of transport. According to a study conducted by RITES it is estimated that of the total inter-regional movement of freight traffic in terms of tonne kms, railways carry 82 per cent and highways 18 per cent. This is indicated in table 9.17. In terms of originating tonnage, the share between rail and road transport is estimated at 67 per cent and 33 per cent rspectively. The average lead of traffic on the railways is 808 kms, and on the road 350 kms. But nearly 30 million tonnes of freight traffic is carried by road transport on an average lead of 700 kms. Certain commodities in small lots and of high value move long distances generally by road. Recently, however, this has been partly due to the inability of the railways to carry all the traffic offered to it. Lately, even coal has been moving long distances by road, a position which has to be rectified suitably by improving rail capacity and ensuring a rational distribution of traffic between the two principal modes. Table 9.18 gives details of movement of commodities by rail and road over distance slabs.

Table 9.17

Inter-Regional Movement Commodity—Wise Tonne Kms Performed By Railways and Highways

(Traffic in million)

Commodity	Railways	Highways	Percentage share		Average lead (Kms)	
			Railways	Highways	Railways	Highways
1	2	3	4	5	6	7
1. Coal	44,140	2,192	95.2	4.8	691	408
2. Foodgrains	20,590	2,091	90.8	9.2	1,278	277
3. Iron & Steel	10,760	2,018	84.2	15.8	1,101	371
4. Iron ore	9,040	12	99.9	0.1	529	96
5, Mineral oils	8,579	1,097	88.7	11.3	656	230
6. Cement	8,453	959	89.9	10.1	717	286
7. Chemical manures	8,371	842	90.9	9.1	1,039	267
8. Salt	4,038	371	91.6	8.4	1,427	320
9. Limestone & dolomite	2,375	141	94.4	5.6	371	267
10. Bamboo timber and wood	2,464	1,259	66.2	33.8	970	312
11. Fruits & vegetables	1,093	3,113	26.0	74.0	1,281	386
12. Chemicals & drugs	1,043	1,010	48.7	51.3	1,277	487
13. Non-ferrous metals	271	304	47.1	52.9	1,067	423
14. Edible oils	79	685	53.2	46.8	1,364	396
15. Products of agriculture other than foodgrains	6,621	2,965	69.6	30.4	—	—
Total All Commodities	148,698	32,371	82.2	17.8	808	354

(Source :—RITES : Study on Commodity Flows).

Table 9.18

Percentange of Tonnage Moved According to Distance Slabs by Railways and Highways During 1978-79

Distance slabs (kms)	Railways		Roads	
	%age of total	Cumulative %age	%age of total	Cumulative %age
1	2	3	4	5
Below 100	6.12	6.12	18.83	18.83
100—150	3.88	10.00	13.09	31.92
150—200	5.98	15.98	9.79	41.71
200—250	3.52	19.50	9.05	50.76
250—300	5.30	24.80	6.93	57.69
300—350	4.58	29.38	10.07	67.76
350—400	4.64	34.02	4.41	72.17
400—450	2.86	36.88	4.34	76.52
450—500	2.27	39.15	3.77	80.29
500—550	3.86	43.01	2.04	82.33
550—600	2.56	45.57	2.13	84.46
600—650	2.04	47.61	1.74	86.20
650—700	1.89	49.50	1.44	87.64
700—750	3.34	52.84	1.60	89.24
750—800	6.49	59.33	1.22	90.46
800—850	1.93	61.26	1.01	91.47
850—900	2.12	63.39	0.56	92.03
900—950	1.73	65.12	0.60	92.63
950—1000	1.17	66.29	—	—
1000—1100	4.34	70.63	0.86	93.49
1100—1200	3.98	74.61	0.82	94.31
1200—1300	5.77	80.38	1.21	95.52
1300—1400	3.18	83.56	0.94	96.46
1400—1500	2.66	86.22	1.16	97.62
1500—1600	2.38	88.60	0.66	98.28
1600—1700	2.49	91.09	0.43	98.71
1700—1800	1.74	92.83	0.30	99.01
Above 1800	7.17	100.00	0.99	100.00

Estimated Inter-regional tonnage moved by Railways 184 m. tonnes and by highways 91 m. tonnes.

(Source : RITES : Study on Commodity Flows)

9.14 Future Demand

9.14.1 A projection of freight demand in 2000 A.D. indicates that the total transport output will rise to about 650 b. tonne kms from the present figure of 235. Considering the magnitude of the task and the effort required, it is essential that advance planning be undertaken to meet traffic requirements on each mode, keeping in view the cost factor and the need for conserving energy. Railways should be geared to carry bulk and long and medium distance freight traffic. Even after diversion of possible traffic to inland waterways and coastal shipping, the burden that the railways will have to bear in 2000 A.D. will be very heavy and the share of freight traffic to be handled by them will in no case be less than 450 b. tonne kms by the end of the century. Considering the fact that till recently there has been a shortage of rail transport, the need is all the more urgent for adequate investment to increase rail capacity and remove bottlenecks. There has been a tendency for wagon turnround to go up on the railways, due to increase in lead, delay in loading or release of wagons by customers, congestion and other organisational problems. There is also the need to provide for resilience in the rail system to cater to problems of unplanned movements, increased requirements of oversized consignments which slows down traffic, periodical disruption due to breaches of the track, and fluctuations in traffic demand.

9.15 Seasonal Fluctuations

9.15.1 Like passenger traffic, freight traffic has also its seasonal fluctuations with peaks from October to March and slumps from May to August every year. The actual capacity required during peak months is about 20 per cent more than what is required if we take the average for the whole year. Extra capacity in our view should, therefore, be built in the system. One of the measures to even out peak requirements and spread traffic throughout the year, thereby reducing investment in providing for peak traffic, will be to have silos and storage accommodation at production centres and ports and create dumps for important commodities.

9.16 Increasing Capacity on Railways

9.16.1 The simultaneous growth of both passenger and freight traffic on railways and that, too, with heavy concentration on main trunk routes is due to disposition of raw materials and, consequently, of economic activity in these areas. In future as well, growth will be predominant in areas served by trunk routes which are already working at saturation levels. Because of this traffic concentration on certain routes and consequent congestion, there are bottlenecks and slow-down of traffic, with a resultant increase in the wagon turnround. If the railways are to carry the traffic projected upto 2000 A.D., it is clear that vigorous steps will be necessary to increase capacity on trunk routes.

9.16.2 Line capacity on important trunk routes of the railways will have to be increased in view of high traffic densities by doubling of tracks and providing better signalling inputs, or opening alternative routes. There are areas where provision of an alternative route can considerably reduce the lead and relieve congestion on some of the already congested yards One of the reasons for acute congestion in some sections is the mix of long distance passenger, freight and suburban traffic on the same corridor at approaches to important cities and terminals. With the mark up in traffic intensities it may become necessary for some of these points to maintain separate corridors and terminals for suburban traffic in course of time as otherwise movement of freight traffic may be adversely affected with consequential repercussion on the economy.

9.16.3 Terminal facilities at some metropolitan and principal cities in India have not been developed adequately to meet the growing traffic demands. Some of these terminals need significant investment for improvement. To facilitate handling of heavy trains and improve wagon turnround, mechanised handling of goods, particularly bulk goods, should be organised, both at loading and unloading points. We also feel that consumer sidings should be developed where wagons can be loaded in bulk mechanically by a group of customers. The large number of small goods loading-points,

distributed over the rail system, where individual wagons are handled, will create problems, and it may be necessary to close down some of them and enter into arrangements with road hauliers for running feeder services to take these goods to bigger terminals from where unit trains can be run. It is in this context that creation of dumps for items like coal, steel and cement will be of considerable help. This will further promote effective rail-road co-ordination, with both modes supplementing each other. There can also be points from where goods can be further transported by inland waterways, for instance, from Gauhati to Tezpur and Dibrugarh. A proper development of such dumps with co-ordinated movement between rail and road and rail and inland waterways can ease pressure on the railways and reduce investment.

9.17 Coal Transport

9.17.1 Being the principal source of energy in India, coal production is likely to increase substantially in the coming years. The present forecast is that nearly 400 m tonnes of coal would be produced in 2000 A.D. Taking into the requirements of super thermal power stations at pit heads, nearly 250-300 m tonnes of coal would still have to be moved by railways. The estimated coal traffic by 2000 A.D. on railways would be thus more than the entire orginiating tonnes moved presently.

9.17.2 Bottlenecks in coal transport are endemic. Planning for transport of coal has, therefore, to be undertaken carefully. Coal mines are concentrated around certain areas in eastern and central India, and coal routes have also become important passenger and freight routes. Depot yards which serve coal pilots have to handle other classes of freight traffic. The result is that with the anticipated increase in traffic there will be severe restriction both in respect of yard and route capacity. Even the arrangement for collection of coal from collieries by working pilot trains to base yards, from where unit trains transport it to destinations, would need to be modified if the projected load of traffic has to be met. Now that the coal industry has been competely nationalised and there is no multiplicity of coal companies in mining and despatching coal, it should be possible for future coal raisings to be transported not by pilot trains but by a system of conveyors to a central depot where heavy unit trains could be mechanically loaded and unit trains despatched direct to consuming centres. For this purpose, existing coal depot yards will have to be suitably remodelled and new yards developed at appropriate points. In a study on coal dumps it has been suggested that Coal India may be given the task of running coal dumps to enable even flow and distribution for small consumers. We endorse this suggestion.

9.17.3 On routes carrying heavy coal traffic, which pass through congested junctions, passage becomes difficult due to mix of passenger and other freight traffic, and in certain areas bypasses and alternate new routes are necessary, particularly in the eastern sector. Such new routes will reduce the distance and transport effort. Development of alternative routes to bypass Mughalsarai, like Singrauli-katni, Asansol-Jhajha, Barauni-Lucknow (after conversion of the metre gauge from Barauni to Barabanki, with a second bridge at Mokameh) needs to be examined and planned to enable the large scale movement of coal visualised by 2000 A. D. As development of capacity in coal depot yards, conveyor system, alternative routes. etc., takes several years, planning should be undertaken and investment made early enough so that coal traffic requirements do not outstrip capacity. The consequences of any neglect in this direction are too serious, and recent experience in regard to coal movement only reaffirms our view.

9.18 Train Load Traffic

9.18.1 Traffic in bulk commodities will increase substantially with a concentration of activity in heavy manufacturing industry and energy production, and this will provide a greater opportunity for direct train load working. It would be appropriate, in our view, to carry bulk traffic through heavier trains, and organise more freight to move from siding to siding to help reduce overall handling costs and better utilisation of rolling stock. A recent study by RITES has identified specific pairs of points carrying traffic other than coal, ores, and petroleum products of over 50 thousand and 1 lakh tonnes per year. For such

pairs of points, or through their grouping, weekly or biweekly train services could be organised on a programmed basis.

9.19 Increase in Speed of Goods Trains

9.19.1 The differential in speeds of mail and express trains and goods trains at about 40 kmph is quite large This has its effect on line capacity as precendences become necessary with increase in traffic. We see no escape from a continuous and steady increase in rail traffic of bulk goods like coal, cement, ores, steel, fertilisers and foodgrains. If unit trains carrying such traffic could run at a speed of 90 kms per hour, it will considerably reduce turnround time and wagon requirement. This will necessitate improvement in wagon design and track structure. Investment in this area will be a step in the right direction, as this will help in improving rail efficiency and in the long run prove economical.

9.20 Transhipment

9.20.1 A serious difficulty on the multi-gauge rail system is transhipment from one gauge to another. Although various mechanical means have been tried, there are limitations to their application in view of traffic mix in covered and open wagons and peculiar problems of commodities. Therefore, transhipment is usually manual at most points, except gravity transhipment for coal and mineral traffic. If transhipment load is heavy there is wagon detention and sometimes loss and pilferage. The problem is further aggravated when traffic is not matched. A major user complaint is that transhipment creates acute problems of tracing such consignments. There are two possible ways to obviate this difficulty, first, to identify such routes where traffic density is heavy on metre gauge necessitating transhipment, and to convert them to broad gauge in a planned manner, and, secondly, to embark on containerisation and piggy backing in a big way, so that the container or trailer can move undisturbed from the originating to destination point, irrespective of the route gauge.

9.20.2 In India there is great potential to develop piggy backing, as it combines advantages of door-to-door service by road transport with economy in cost for long distance traffic provided by the railways. The advantage of piggy backing over the container is that the trailer can move on to the flat without having to be lifted by crane at loading and unloading points. Railways will also have to go in for more container and piggy back terminals, keeping in view the international traffic in containers which is bound to increase in future.

9.21 Computerised Wagon Control

9.21.1 We anticipate that the need will soon arise for computerised wagon control to enable better wagon utilisation and service to the user. With the completion of micro-wave network on the Indian railways, it will be timely for the system to opt for computerised wagon control and passenger reservations to enable it to handle large volumes of traffic quickly and efficiently.

9.22 Parcel Traffic

9.22.1 Parcel tarffic is steadily increasing on the railways and facilities for handling such traffic at the existing terminals, particularly in the metropolitan cities, are inadequate, as also for meeting refrigerated traffic requirements. Both these deserve attention. Points should also be identified for unit trains to run for parcel traffic at a fast speed. "Smalls" traffic could also be cleared by such trains and freight forwarding agencies encouraged to club the traffic.

9.23 Tariff Structure*

9.23.1 The tariff structure of railways as it obtains today is such that most commodities pay fully for their transport. This is a step in the right direction. We are of the firm view that tariffs should be related to transportation cost to ensure that commodities are moved by the lowest-cost mode.

9.24 Gauge Conversion

9.24.1 About 25,500 route kms of metre gauge are mainly in the eastern U.P., northern Bihar, Assam, parts of Rajasthan and Gujarat and southern India. In these areas metre gauge was originally laid as mostly passenger traffic was anticipated, not goods, in view of low level of

* See Chapter 4, Sec. 4.2 for our views on rail tariff policy.

industrial activity. The terrain was also difficult in certain areas of Assam and in the south where metre gauge construction was found to be cheaper and easier. In 1961 a through link between the north and south was established after completion of the Khandwa-Hingoli section, and now a metre gauge wagon can go right from Digboi in the far north east to Tuticorin in the south.

9.24.2 The metre gauge system being so well-spread cannot altogether be converted into broad gauge nor is it necessary to do so, except on certain routes where traffic densities are heavy or transhipment causes a severe bottleneck. The traffic pattern on metre gauge is such that 15 main routes, which form only about 30 per cent of total kilometrage, account for 70 per cent of total freight traffic and 50 per cent of passenger traffic.

9.24.3 The carrying capacity on metre gauge per track km for a passenger train is marginally lower than that on broad gauge. But for freight the difference is substantial, as on broad gauge a train can carry 60 per cent more traffic than on metre gauge. The construction and maintenance cost of one km of metre gauge line is about two-third of broad gauge. Conversion to broad from metre gauge is advantageous only on such routes as have heavy freight traffic.

9.24.4 The main limitations on metre gauge are its comparatively slower average speed, and transhipment difficulties. Being passenger oriented there are more stopping passenger trains on metre gauge. Coupled with a predominantly steam traction, the average speed is lower. The progress of dieselisation has been rather slow on metre gauge because priority is given to broad gauge for moving larger quantum of freight traffic. We recommend priority should now be accorded to dieselisation of important sections on metre gauge.

9.24.5 Rolling stock on metre gauge should also be improved with better axle loads to move heavier trains at faster speeds. Other technological inputs such as improving track structure and rolling stock, with heavy axle loads and higher-powered locomotives, will certainly lead to more efficient and economical operation on metre gauge. It should also be possible to run fast inter-city trains like the Pink City Express and the Pandiyan Express between selected pairs of points.

9.24.6 Even though operation on most of metre gauge routes can be quickly improved by technological inputs and modernisation, there will still remain certain sections which need to be gradually converted to broad gauge. Already about 1,100 kms have been converted from metre to broad gauge and nine more routes covering about 2,500 kms are planned for conversion; work on 1,700 kms is, in fact, in varying stages of progress. Routes where transhipment load is heavy, or which serve major ports, should get priority for conversion. For example, conversion of a route like Ahmedabad-Delhi will give Kandla port direct access to consuming centres like the Punjab and Haryana which will not only accelerate growth of Kandla port but also of the national economy. Similarly, if metre gauge connections to Goa and Tuticorin were converted to broad gauge, utilisation of capacities at these ports could be improved thereby relieving congestion particulaly at Bombay and Cochin ports.

9.24.7 Four important conversion projects taken up a few years earlier, namely, Viramgam-Okha, Barabanki-Samastipur, Bongaigoan-Gauhati and Guntakal-Bangalore, have yet to be completed, resulting in locking up of metre gauge stock which could be used elsewhere. Similarly, in anticipation of conversion no improvement to metre gauge could be carried out on the high density Ahmedabad-Delhi route. We urge that projects on hand should be completed as early as possible, so that metre gauge stock can be utilised elsewhere where there are shortages. As conversion of Ahmedabad-Delhi section may take atleast six to seven years to be completed, it would be appropriate to provide it with inputs for carrying the growing traffic.

9.24.8 In taking up conversion projects it should be ensured that the through link in the all-India network of metre gauge is not disrupted.

9.25 Narrow Gauge

9.25.1 Narrow gauge system on the Indian railways comprises short branch line connecting either broad or metre gauge systems. Narrow gauge on the south eastern railways, however, has a connected route of about 1,000 kms in Central India and carries 60 per cent of total narrow gauge freight traffic. The average lead of freight traffic on narrow gauge was 93 km in 1977-78, the freight traffic carried was less than 0 2 per cent of total freight traffic on the Indian railways. Even though narrow gauge is primarily passenger-oriented, it accounts for only 1 per cent of total passenger traffic on Indian railways.

9.25.2 These sections were useful in areas not served by proper roads, particularly in the hill sections. With road network development and efficient road transport, there appears to be no longer any justification for such lines. The average cost of handling a tonne km is about 40 paise on narrow gauge, which is much higher than road transport costs. Passenger costs are also high. Except for retaining the Central India narrow gauge system and some hill sections for their engineering skill and for limited tourist traffic, it would be better as a policy measure to close down all narrow gauge sections. However, a systems approach could be adopted where their conversion to either metre or broad gauge may form a part of a network and is justified on traffic potential.

9.25.3 We, therefore, recommend a phased programme for closing narrow gauge lines. The resistance to closing such lines may not be great if formation and other permanent assets are handed over free to State Governments or local authorities. Before closing these lines, it should be ensured that adequate and efficient road transport services are available to serve those areas.

9.26 Uneconomic Lines

9.26.1 There are 126 branch lines on all the three gauges on the Indian rail system, identified as uneconomic by several high-level committtees, and the general consensus is in favour of closing them if transport needs of the area can be adequately met by road services. The only exception could be such lines on broad and metre gauges which in the form of short spurs might serve as alternative routes to relieve congestion by connecting them to suitable points on existing routes either as they are or after conversion. Subject to these exceptions uneconomic branch lines should be closed down as they act as a drag on financial viability of railways.

9.27 Traction policy

9.27.1 The traction policy to be adopted by railways has significance in view of oil shortage. Apart from price factor, non-availability of oil even at exorbitantly high price may compel us to find alternative sources of energy for railway transportation. Unlike road transport, railways have the option to use alternative energy sources by using either coal or electricity. Expanding steam operation is uneconomic, as burning coal in steam locomotives is the least efficient form of coal utilisation. For example, traffic carried on steam traction requiring 12 million tonnes of coal can be handled by electric traction utilising energy equivalent to only 2.5 m tonnes of coal. Moreover, steam operation reduces line capacity. In the context of expanding traffic a larger investment will, therefore, be required on line capacity if handled by steam traction. We, therefore, recommend an accelerated plan for railway electrification and its implementation in a phased manner.

9.27.2 A comparison of the extent of electrification on Indian railways with that of other countries will show up its limited progress in India Most European countries have already switched over to electric traction for main trunk routes. In the U. S. S R the share of freight traffic by electric traction has increased from 8.4 per cent in 1955 to 52.9 per cent in 1977. In route-kilometres electric traction increased from 5,400 kms in 1955 to 45,000 kms in 1977. A comparison of electrification on Indian railways with other railways is shown in table 9.19.

Table 9.19

Electrification of Railways—An International Comparison

Country	Electrified route length as a percentage of total route length	Total Route length (miles)
1	2	3
Switzerland	99	1,800
Sweden	62	6,900
Netherlands	61	1,800
Norway	58	2,600
Luxemburg	58	200
Italy	48	10,300
Austria	48	3,400
Japan	40	13,200
W. Germany	35	17,900
Bulgaria	44	2,500
Belgium	32	2,500
USSR	29	84,100
France	27	21,600
Spain	26	8,300
Yugoslavia	25	5,800
Poland	22	14,700
Great Britain	20	11,200
Czechoslovakia	16	8,100
Hungary	16	4.700
Portugal	14	1,800
Roumania	12	6,500
India	7.8	37,940 (60,700 kms.)

Source : Railway Directory and YearBook 1977

9.27.5 In India rail electrification made significant progress between 1961-69 when a total of 2,660 kms were electrified in eight years. Till 1961 total route kms electrified were only 573. The progress of electrification on railways after 1969 slowed down, as can be seen in table 9.20

Table 9.20

Progress of Electrification on Indian Railways

Year	Route kms electrified
(1)	(2)
Before 1956	357
1956-61	216
1961-66	1,755
1966-69	905
1969-74	956
1974-78	531
Total	4,720 (7.8 per-cent of the route)*

9.27.4 A recent study** on dieselisation and electrification of the Indian railways indicates that 30 m tonnes of gross traffic on a double line section is the break even level to make electric traction viable. This study also brings out that with a larger number of high density routes still being operated on diesel traction and anticipated traffic increase on main trunk routes, an annual electrification programme of about 350 kms of route in the next ten years in a phased basis is necessary. This is the least the Indian railways should do in the context of oil resources constraint and electric traction efficiency. The main routes covering the four metropolitan cities and high mineral-carrying routes should be given priority for electrification.

9.27.5 Hikes in fuel costs are already increasing operating costs of diesel more than electric traction. We are convinced that with continuing oil shortages and further increases in oil prices the case for covering main rail routes by electric traction assumes urgency.

9.27.6 Steam traction at present accounting for nearly 30 per cent of traffic consumes about 12 million tonnes of coal. An accelerated pace of electrification will help in replacing steam by diesel locomotives on low-density routes. Table

* Also see map at page 156A.

** Study of Relative Economics of Diesel and Electric Traction on Indian Railways - June 1978.

9.21 shows fuel consumed traction-wise on railways in 1977-78 and the possibility of saving nearly Rs. 100 crores on rail fuel bill if traffic carried on steam traction is replaced by electric traction. In addition, some 10 to 12 million tonnes of high grade coal could become available to other consumers.

Table 9.21

Traffic Carried and Fuel Consumed Tractionwise on Railways, 1977-78

Mode of Traction	Gross Tonne kms (b)			Fuel Consumption	Cost (Rs crores)
	Passenger	Freight	Total		
1	2	3	4	5	6
Steam	80.95	51.67	132.62	12.27 m tonnes	143.26
Diesel	40.87	187.45	228.32	0.788 ,,	118.6
Locomotive	24.72	83.57	108.29	1542 m kwh	36.2
Electric EMU	13.35			518 m kwh	12.9

9.27.7 We, therefore. recommend an electrification programme on the railways of 350 kms per year to cover trunk and main routes and replacement of steam by diesel and electric traction on a priority basis.

9.28 Policy on New Railway Lines

9.28.1 Background

The policy to be adopted for construction of new railway lines during the next two decades is an important question, not only because, in our view, expansion of rail network has to be given priority in the context of the role assigned to it in a suggested optimal intermodal mix, but also because of persistent demands for new railway lines made by State Governments and public bodies for promoting development of backward areas and fuller exploitation of natural resources. Many new railway lines were surveyed in the past but very few taken up for construction, and even for these new lines the period of completion was unduly long. All these points were placed before the Committee by State Governments and public bodies.

9.28.2 Since 1950-51 the Indian rail network has been extended by 5,750 kms. or, in other words, by about 13 per cent. In addition, 900 kms. of railway lines, dismantled during World War II, were restored after 1950-51, and 350 kms taken over from private companies. Thus, the total addition to rail network during the last 30 years comes to 7,000 kms. Each time a new line is constructed, a detailed engineering and traffic survey is conducted to assess cost, traffic prospects and anticipated financial returns. Normally, only financially remunerative or project-oriented lines are taken up but new railway lines were also constructed in the past for developmental purposes, as connecting links and for strategic reasons. A list of new lines constructed Since 1950, with anticipated returns and those that actually materialized, is shown in table 9.22.*

* Also see Map at page 157A.

Table-9.22

New Railway Lines Constructed 1950-76

Name of the Section		Railway	Length in kms	Daily No. of trains run (1977-78)		Return in %age	
				Pass	Freight	Envisaged	Obtained
1			2	3	4	5	6
Broad Gauge							
1	Buti Bori-Umrer	Central	34	—	1.3	7.3	134.9
2.	Diva-Panvel-Uran	,,	54	3 —	0.8 1.1	N.A.	19.32(DP) 5.8 (P-U)
3.	Singrauli-Katni	,,	246	1	0.4	N.A.	—4.27
4.	Barasat-Hasnabad	Eastern	33	6	—	3.97 11th Year	—3.36
5.	Bakhtiarpur-Rajgir	,,	54	3	0.6	1.5	0.68
6.	Panskura-Haldia Port	,,	70	3	3.6	8.25	8.38
7.	Robertsganj-Garhwa Road	,,	163	4	11.2	4.68	7.53
8.	Barhan-Etah	Northern	62	2	0.3	3.98	—2.17
9.	Chunar-Churk	,,	79	4	2.2	5.57	16.81
10.	Ghaziabad-Tuglakabad	,,	54	13	14.6	18.4	0.39
11.	Hindumalkot-Sriganganagar	,,	27	5	1.0	2.55	24.57
12.	Kathua-Jammu	,,	77	7	6.5	7.71	19.77
13.	Mukerian-Pathankot	,,	43	9	5.3	0.05	N.A.
14.	Singrauli-Obra	,,	57	1	5.9	9.74	23.05
15.	Khajuriaghat-Malda.	North Frontier	37	9	13	16.77	10.77
16.	Kumedpur-Barsoi	,,	25	5	6.3	—1.87	46.14
17.	Siliguri-Jogighopa	,,	265	4	3.6	N.A.	3.10

(Table 9.22 Contd.)

(Table 9.22 contd.)

1		2	3	4	5	6
18. Turnagullu-Mudukurapenta	Southern	24	N.A.	N.A.	10.0 to 15.0	N.A.
19. Bhilai-Dhallirajhra	South Eastern	85	1	7.0	11.50	59.1
20. Bimlagarh-Kiriburu	,,	41	—	5.0	6.67	62.36
21. Bondamunda-Purna Pani	,,	28	1	5.5	42.75	6.07
22. Pauridand-Karonji	South Eastern	85	1	7.7	5.25	44.90
23. Champa-Korba	,,	51	2	5.9	11.07	33.5
24. Chandrapura-Ranchi-Hatia	,,	143	1	5.5	42.73	43.66
25. Cuttack-Paradeep	,,	84	1	5.0	10.43	N.A.
26. Hatia-Nowagaon	,,	137	1	5.5	9.27	6.07
27. Kottavalasa-Bailadilla	,,	447	1	7.5	4.69	10.22
28. Noamandi-Banaspani	,,	28	2	18.5	8.53	72.66
29. Rourkela-Dumaro	,,	67	1	12.5	8.04	21.92
30. Sambalpur-Titlagarh	,,	182	2	5.5	13.8	17.11
31. Guna-Maksi	Western	193	1	1.6	—4.23	N.A.
32. Indore-Ujjain	,,	71	5	1.8	8.39	10.34
33. Jhund-Kandla	,,	231	2	5.7	9.42	40.76
34. Sabarmati-Gandhinagar	,,	28	1	1.8	6.75	105.88
Metre Gauge						
1. Khandwa-Hingoli	Central	303	3	3.5	3.06	—4.63
2. Fatehpur-Churu	Northern	33	3	—	3.85	3.60
3. Pokaran-Jaisalmer	,,	105	1	1.0	(Strategic line)	—4.44
4. Kalkorighat-Dharamnagar	North Frontier	31	2	1.6	—1.7	—0.48

Table 9.22 (contd.)

(Table 9 22 contd.)

1		2	3	4	5	6
5. Rangapara-North-Lakhimpur-Morokonselek	North-Frontier	328	2	2.0	—1.55	—4.64
6, Arantangi Karaikudi	Southern	27	3	0.3	N.A.	—
7. Bangalore-Salcm	,,	229	2	2.1	5.54	2.07
5. Hassan-Mangalore	,,	189	—	—	1.5	—
9. Manamadurai-Virudhunagar	,,	66	1	3.4	5.2	26.04
10. Quilon-Ernakulam*	Southern	154	9	2.6	3.75	9.45
11. Dabla-Singhana	Western	33	—	—	N.A.	—
12. Gandhidham-Deesa	,,	272	2	6.5	2.74	14.35
13. Gop-Katkola	,,	32	1	4.0	6.93	26.94
14. Raniwara-Bhildi	,,	70	2	3.0	—1.84	4.56
15. Udaipur-Himmat-nagar.	,,	215	1	1.7	4.79	9.61

9.29 Review of Railway Lines Built since 1950

9.29.1 The Committee appointed a Working Group to examine inter-alia the benefits that have accrued from construction of new lines in the past The study shows that new lines were constructed since 1950 for one of the following reasons :

(a) to serve specific industrial projects,

(b) as strategic lines,

(c) in replacement of narrow gauge lines,

(d) to give access to a backward and an underdeveloped area.

(e) as a missing link or as a through alternative route.

9.29.2 A project for a new line is considered to be remunerative if it yields a return of 6.75 per cent on capital investment in the sixth year of its operation. This percentage is expected to cover dividend liability of 6 per cent and make a fair contribution to depreciation reserve fund and development fund of the railways. On the basis of these criteria the Working Group found that although, at the time of construction, 25 out of 49 lines were expected to remain unremunerative in the sixth year of their operation, only 15 lines were actually so as of 1977-78. The earnings of 10 of these lines were lower than the prescribed return of 6.75 per cent, while the remaining five lines were actually operating at a loss in the sixth year of operation. A study of these lines show that the lines which have not proved remunerative are those which were specifically conceived to fall under the following categories:

(a) strategic lines like Rangapara North-Lakhimpur-Morokonselek and Pokaran-Jaisalmer ;

* Since converted to Broad Gauge

(b) new lines constructed in place of narrow gauge lines like Barasat-Hasnabad and Bakhtiarpur-Rajgir to serve suburban and pilgrim traffic;

(c) alternative routes or missing links like Singrauli-Katni line, Khandwa-Hingoli line, Salem-Bangalore line, and Ghaziabad-Tughlakabad diversion line ; and

(d) lines to provide access to underdeveloped, remote and backward areas like Kalkalighat-Dharmanagar and Burhan-Etah.

In other words all these lines have served the purpose they were designed for at the time of construction, and the rate of return was, except in a few cases, more than what was originally anticipated.

9.30 Investment Criteria

9.30.1 In evolving an acceptable set of investment criteria for judging desirability of new railway lines, it is necessary to distinguish between the objectives new lines are intended to subserve and the appraisal process they must go through to prove their financial and economic viability. In the past new lines were constructed to satisfy both economic as well as non-economic social objectives, the main economic objectives being to meet specific traffic requirements of industrial projects in the plan or promote economic development generally of the more backward regions of the country. The socio-political objectives were to meet the country's strategic and social security needs and promote national integration. While project-oriented lines can give adequate financial returns, these may not be forthcoming from new lines designed to serve socio-political objectives or for purely developmental purposes.

9.30.2 Until recently the conventional method of appraising financially a new project has been followed which requires at least 6.75 per cent return on capital investment in the sixth year of its operation, This has now been replaced by the "discounted cash flow" (DCF method), under which a project is justified if it earns an internal rate of return (IRR) of at least 10 per cent on capital investment. The DCF method requires a higher rate of return for justification of a project, and we feel there is need for caution in its application to proposals for new railway lines on two grouuds. First of all, in assessing potential earnings from new lines the railways take into account earnings from traffic generated in the system as a whole, but not for benefits that accrue by diverting traffic from longer routes. The point we want to stress is that while the railways may apparently lose some revenue because of reduction in the distance hauled on a shortened new route the savings in total transport effort and to the economy are not assessed at all. This is an important aspect when we examine the growing demand for rail transport and inability for the present trunk routes and of the system to haul the traffic. Any shortening of lead by a new railway line and diversion of traffic from the existing saturated trunk routes is a positive gain to the economy and should not be characterised as a loss in revenue to the railways. Thus, unless benefits accruing by diverted traffic are taken into account IRR is likely to be understated. Secondly, as there are limitations on the extent to which railways can in practice adjust their fares and freights on the basis of their costs, the net revenue earned by them does not correctly indicate benefits actually accruing to users. All this points to the need for applying a wider social cost-benefit criteria frame for appraisal of new railway line projects. Such criteria were applied by a committee set up by the Planning Commission for evaluation of new railway lines in the north eastern region. In our view, the railways should develop a similar frame for appaising new railway lines.

9.31 Criteria for Choice of New Railway Lines

9.31.1 New railway lines fulfil the following objectives:

a) as project-oriented lines to serve new industries or tap mineral and other resources ;

b) to serve as missing links which can form alternative routes to relieve congestion on existing busy rail routes ;

c) on strategic considerations ; and

d) as developmental lines to establish new growth centres or give access to remote areas.

It has been represented to the Committee that the present pattern of concentration of growth in certain areas, with its accumulated problems of congestion, cannot be overcome without establishing new growth centres and that, if such new growth centres are to attract industrial activity rail connections are necessary. In exploitation of mineral and forest resources rail participation is significant. Movement of bulk commodities like minerals is best served by railways. Efforts have to be continuously made to develop underdeveloped regions through wide-ranging government intervention. These underdeveloped regions are often at a disadvantage because of their inaccessibility. For example, the north eastern region and certain other parts of the country suffer from isolation from the mainstream due to their geographical remoteness and relative inaccessibility. We feel that a "non-rail" situation will not help development and exploitation of natural resources if they exist on an appreciable scale. Therefore, any region where natural resources on a largescale are evidently available an integrated plan should be evolved to develop new growth centres and promote economic activity, the provision of a new rail line being an element in such developmental plans. In these schemes socio-economic benefits should have priority over purely financial considerations. It may, therefore, be necessary to undertake projects which may yield a lower return than the stipulated 6.75 per cent. However, it will not be advisable to take up new railway lines which cannot meet operating costs, including contribution to depreciation.

9.31.2 For rationalizing transport, reducing total transport effort and relieving sections of existing saturated network are important criteria for construction of new lines. There are trunk routes like the Grand Trunk route, the Bombay-Madras route, the east coast line and the Kharagpur-Tatanagar section, which are working to a saturation point and where traffic densities will continue to grow. Even after doubling and electrification, these routes will not be able to carry total traffic which will develop on the system. It is in this context that there is an urgent need for developing alternative routes on which traffic can be diverted, reducing leads and consequently total transportation effort. The saving in energy as a result of reduced transportation effort is of great value to the economy in the context of energy shortages. There is for example a missing link between Bombay and Mangalore. Traversing the potentially rich west coast areas this link will reduce lead on the north south traffic by about 600 to 1000 kms and considerably relieve congestion on the Grand Trunk and Bombay-Madras routes. A study conducted through the Government of Maharashtra at the instance of the Committee showed that if this West-Coast line is constructed, it will carry a heavy volume of traffic, including diverted traffic, thereby not only relieving congestion on existing trunk routes but also in helping to develop the region.

9.31.3 There are similar missing links in other areas as well. For example, a new line connecting Talcher to Sambalpur will reduce the distance from Cuttack aud Bhubaneswar to Delhi substantially and, at the same time, relieve congestion on saturated sectors between Cuttack and Kharagpur to Tatanagar which are at present heavily worked lines. Similarly, a line from Koraput to Rayagada will enable opening up of mineral and forest resources in the Bailadilla-Koraput areas by providing an alternative route and by-passing heavily-graded Ananthagiri ghats. There may be other cases as well where, by extending an existing short spur or constructing a missing link, the system viability can be improved and total transportation effort reduced.

9.31.4 In our view, wherever existing routes are heavily congested, even after doubling tracks, building an altogether new route between the main nodal points will give the system a better viability than addition of a third track. Such an alternative route will keep traffic routes open even during dislocations caused by natural calamities such as floods, accidents, etc., on the existing routes. These strategic considerations are significant in planning expansion of the future rail system.

9.31.5 Generally speaking, addition of short spurs disconnected from the mainstream, particularly in metre gauge, do not add to system capability and result in operational losses. There can be exceptions in the case of States, totally unconnected by rail such as States in the north

eastern region, where for establishing rail heads short spurs may be necessary. However, as a general rule, it is better not to go in for short spurs but to extend existing spurs or close missing gaps in the choice of new railway lines for construction.

9.32 **Provision of Finance**

9.32.1 In our view the Indian railway network has remained static since Independence, and for a country of our size, with its population, vast potential and anticipated growth of traffic its expansion is essential. New growth centres can be established and congestion removed from existing metropolitan cities and other growing cities only through a judicious expansion of the railway network. From our point of view, during the next two decades, the railway network will have to be expanded by at least 5,000 kms involving a capital outlay of Rs. 1250 crores at constant prices. This order of outlay is not too great a burden, if the importance of Indian railways is taken into account in the future transport system of the country. During the previous Plans, outlay on new railway lines was around Rs. 100 crores in a five-year period, which retarded extension of rail facilities to many places and, in turn, contributed to concentration of traffic on existing trunk routes. An allocation of Rs. 300 crores in each Five Year Plan over the next two decades at present day prices for new railway lines is, in our view, justified and reasonable.

9.33 **Summing Up**

9.33.1 Railways have been, are and will continue to be the nation's principal mode of transport. The task we visualise for the railways in future is enormous with steady increase in demand for both freight and passenger traffic.

9.33.2 The utilisation of assets created have improved over the years, traffic densities increased many-fold and most of the trunk routes are working at saturated levels. There have been frequent shortages of rail services, particularly in the recent past, with bottlenecks appearing in the system. There is thus a need to provide resilience in the rail system to meet changing patterns of traffic and sudden spurts in demand. This would call for an increased investment in the system to enable the railways to meet the demand. Investments are, indeed, a determining factor for the future of the railways for their development.

9.33.3 There is a need to expand the network, provide alternative corridors to busy saturated trunk routes, new connections to reduce the transport effort and to develop areas rich in mineral and forest resources. For the uneconomic and narrow gauge lines a phased programme for closing them needs to be undertaken.

9.33.4 Railways are an energy efficient mode and provide alternatives in the choice of traction. To conserve scarce energy resources we feel that there is an urgent need to accelerate the pace of electrification to cover the main trunk routes with electric traction.

9.33.5 Railways should organise freight train operation in train loads from siding to siding, run heavier trains for bulk traffic like coal through unit trains bypassing marshalling yards. It should provide technological inputs to the metre gauge system, introduce computerised wagon control and extend container and piggy back services and augment terminal facilities.

Chapter 10

Road Development

10.1 Introduction

10.1.1 India has an extensive road network which serves all types of surface transport vehicles—trucks, buses, cars, animal-drawn carriages and bicycles. Apart from carrying traffic independently from point to point, our road system is the main feeder to the rail system and ports and harbours and thus forms part of an integrated transport network. In almost all areas not served by railways, roads are the only means of transport and communications. Roads are also one of the basic infrastructures for socio-economic development, particularly of backward areas. Road development in India is the responsibility of the Government. Financial allocation for both road and road transport in the First plan was Rs. 147 crores.[1] This was increased to Rs. 242 crores in the Second Plan. In the Third Plan allocation for road development alone stood at Rs. 440 crores which increased to Rs. 862 crores in the Fourth Plan, Rs. 1353 crores in the Fifth Plan and Rs. 2599 crores in the 1978-83 Plan, the last figure being twice the Fifth Plan outlay. As on 31 March, 1976 the total road length in the country was 13.84 lakh kms, of which 5.46 lakh kms was surfaced. By 31 March, 1979 the total road length is estimated to have increased to 14.80 lakh kms. Available data on growth of road length in the country since 1950-51 is given in table 10.1.

Table 10.1

Growth In Road Length

(In '000 km)

Road categories	1950-51	1960-61	1971-72*	1975-76
1	2	3	4	5
National Highways**	19.70	22.50	28.82	28.87
	(N.A)	(21.16)	(28.17)	(28.28)
State Highways**	42.56	61.69	95.20	97.70
	(N.A)	(N.A)	(87.17)	(90.48)
District Highways	170.08	224.14	464.69	556.19
	(N.A)	(N.A)	(221.87)	(292.15)
Village/Rural Roads	165.28	386.58	193.62	410.99
	(N.A)	(N.A)	(32.38)	(56.70)
Urban Roads	(N.A)		62.42	85.81
		10.09	(42.90)	(62.70)
Project Roads	(N.A)	(N.A)	178.28	204.37
			(12.15)	(16.62)
Total:	397.62	705.00	1023.03	1393.93
	(156.11)	(234.42)	(424.64)	(546.40)

[1] A separate figure for expenditure on road development is not available.

Source: *CTPC Report (1966)* and Ministry of Shipping & Transport.

Note: Figures in brackets relate to surfaced road length.

*Reliable data for 1970-71 not available.

**A map showing existing network of these highways is at page 168A.

Historical Background

10.1.2 While the history of road development in India goes back to the early ages, organised effort at road building at the national level in the recent past may be traced to the year 1929, when the Jayakar Committee considered schemes for improvement of the road system in a comprehensive manner. It was on the recommendation of this Committee that the role of the Central Government in regard to development of road system was recognised. Later, in 1943, chief engineers-in-charge of roads in the country met at Nagpur to consider requirements of the road system over a twenty-year period beginning December 1943. The Nagpur Plan classified roads as national highways, state (or provincial) highways, district roads and village roads, and prescribed standards, norms and targets for road development of various categories. In agriculturally developed areas, the target set was that no village should be more than two miles away from a road or more than five miles from a main road, the average distance from a main road being less than two miles. In non-agricultural and less developed areas, accessibility was to be within five miles from a road and not more than twenty miles from a main road, the average distance being six to seven miles in most cases.

10.1.3 Road development plans in the post-war reconstruction phase and during the First and the Second Plan periods broadly followed the approach of the Nagpur Plan. At the end of the Second Plan, over-all road mileage targets envisaged in the Nagpur Plan had been realised. The progress as between individual States and regions was, however, not uniform.

Bombay Plan

10.1.4 In 1957 chief engineers-in-charge of road and bridge development of the Central and State Governments met to formulate a new road plan for 20 years, starting from 1961. Popularly known as the Bombay Plan, the target set in it was that no village should be more than four miles from a metalled road or more than one-and-a half miles from any type of road in developed agricultural areas. While working out specific proposals, considerations of the size of area, population, regional levels of development and future potential were taken into account. Transport requirements of administrative centres, places of pillgrimage, health resorts, tourist centres, big railway junctions, ports, and defence and strategic points also had to be considered in an integrated road system. The Bombay Plan framed a scheme of priorities which included among others, provision of missing bridges, improvement of road surface to at least one-lane black-topped specification for national and state highways, widening of main roads in the vicinity of large towns to two lanes or more and provision of two lane roads on major arterial routes. The plan anticipated an increase in road length from 3.79 lakh miles (6.09 lakh kms) in 1961 to 6.57 lakh miles (10.51 lakh kms) in 1981, of which over 40 per cent were to be surfaced roads. The Bombay Plan target was to achieve an over-all density of 32.5 kms of roads per 100 sq. kms of area; 44 kms of roads for developed agricultural areas; 19 kms for semi-developed areas, and 12 kms for under-developed areas. The cost of completing the programme was estimated at Rs. 5200 crores (at 1958 prices), of which Rs. 630 crores were for village roads.

10.1.5 Against the target of 51,200 kms of national highways in the Bombay Plan, actual realisation by March 1978 was 28,970 kms only, of which 98 per cent or 28,508 kms was surfaced road length. The estimated achievement for state highways was 98,000 kms (of which 90,000 kms was surfaced length) against the target of 1,12,000 kms. For major district roads, other district roads and classified village roads taken together, the Bombay Plan target of 8.88 lakh kms has, however, been more than realised with the construction of 9.7 lakh kms of roads. Of national highways, 63 per cent have a two-lane carriageway width. Most of the roads of other categories have a single-lane carriageway width.

10.1.6 The Bombay plan did not include "project" and "urban" roads. Project roads are constructed and maintained by Government Departments like irrigation, forest, electricity and sugarcane and by agencies like Central Coal Mines Authority and Central Electricity Authority. Most of these roads were developed primarily to provide access to material resources for concerned agencies. The urban roads are developed and maintained by local bodies, namely, municipal

authorities, notified area committees, cantonment boards, Central Public Works Department, Railways, port authorities, and Military Engineering Service.

Need for Another Perspective Plan

10.1.7 Now that the Bombay Plan period (1961-81) is about to end, we suggest formulation urgently of another perspective road development plan for the next 20 years ending 2001 A.D. In such a plan, it would be essential that all relevant factors, such as (i) the urgent social need to connect rural, hilly, tribal and backward areas with administrative, market, health and educational centres, (ii) security requirements, (iii) traffic needs (iv) need for effecting fuel economy through provision of good roads, and (v) requirements for non-mechanised traffic, such as that of bicycles, cycle-rickshaws and bullock carts, are given due weightage and competing claims judiciously balanced. In view of financial contraints, oil shortage and also in the interest of optimising output of the existing road system, priority, in our view, should be given to construction of missing links in the arterial network which would considerably shorten travel distance. At the same time, it is necessary to improve low grade sections, strengthen weak bridges and culverts, rationalise road alignments, construct bypasses on main roads where necessary, and provide suitable stream-crossings on unsurfaced rural roads. Further, such a perspective plan should not be confined to only prescribing accessibility targets on a global basis for "developed", "semi-developed" and "under-developed" categories in general; it should also provide a spatial dimension by breaking up segments, region and state-wise, keeping in view the peculiar conditions in each region. As road system requirements vary in States and regions, according to differences in the land-use pattern, population, terrain, stage of and potential for economic development and travel characteristics, regional and State plans should form part of a balanced road network. It is also essential that the new perspective plan, unlike the Bombay Plan, takes into account all roads, including "project" and "urban" roads, as these roads, being used by the general public as well, must form part of the national road network. Appropriate standards for project and urban roads should be prescribed, taking into account the traffic requirements. We would stress that such a comprehensive blueprint of road development should be framed at a broad-based forum comprising chief engineers-in-charge of roads and bridges from the Centre and the States and development commissioners of the States. It will also be useful to associate transport economists and planners in preparing this plan.

10.2 Road Classification

10.2.1 The functional role of standard categories of roads, (national and state highways, major and other district roads and village roads), described in the Bombay Plan, is reproduced in annexure 10.1. Apart from standard road classification, other district roads and classified village roads, came to be recognised as rural roads following the Report of the Committee on Rural Roads (Sinha Committee Report-1968). We have briefly considered the functional classification of roads, and do not suggest any change, as the existing classification by and large has served the purpose.

Standards

10.2.2 Keeping in view the functional requirements for various categories of roads, their standards and specifications have been prescribed by the Indian Roads Congress (IRC) to ensure uniformity in regard to fundamental aspects like gradients, curves, sight distances and land width.* According to the prescribed norms, national and state highways (the main arterial routes of the road system), have to be open for all-weather use, with modern surfacing. Intersections to these roads have also to be limited. Pavement width would depend on traffic requirements. Major and other district roads too should be suitable for all-weather use but the former is required to have at least a metalled single-lane carriageway and the latter a single-lane carriageway of low-cost, such as of stabilised soil or gravel. The IRC standards for carriage-way width and load-carrying capacity of roads in terms of passenger car units are given in annexure 10.2.

Policy on Carriageway Width and Pavement Crust

10.2.3 The present policy of provision of carriageway width as well as pavement crust is

*The prescribed standards and specifications of roads also are given in annexure 10.1.

based on traffic forecast for five years following completion of road works. In view of financial constraints, road improvements are generally carried out in the country under "stage construction"* process, which involves frequent interruptions to traffic-flows. We have considered the matter, and feel that designing of roads with a five-year potential is somewhat on the low side, as the normal life of main roads (national and state highways, and major district roads) is more than 25 years. In our view, it would be more appropriate if traffic requirements for 10 to 15 years are kept in view. This would in the long-run lead to reduction in the cost of road construction and maintenance. We notice that State Govenments at present do not follow a system of periodical updating of inventories of highway and bridge conditions, composition and intensity of traffic handled by them and their effective life. We need hardly stress that an appropriate system of road inventories and their regular updating every five years are pre-requisites for road planning, especially for improvement of the road system through "stage construction" process which perhaps will continue to be followed in view of financial constraints. We have noticed that at present bulk of the state highways and major district roads has a single-lane carriageway width. We would suggest that appropriate plans for a double-laning of these roads should be formulated in advance in the context of traffic requirements for a longer time-horizon, say of 10 years.

10.3 National Highways

10.3.1 The Central Government is directly responsible for development and maintenance of national highways under the National Highways Act 1956. But the actual work is executed by State Governments on an agency basis. The present length of national highways, which provide main arteries of road network, is 29,000 kms (almost entirely surfaced) and constitute about 6 per cent of total surfaced road length in the country. These highways are estimated to carry 25 to 30 per cent of total road traffic, and are designed for a maximum single axle load of 18000 lbs or 8.16 tonnes.

Need for Strengthening Network

10.3.2 Development of national highways has lagged behind both in route length and load-carrying capacity. Numerous representations were made to us during our visits to States that the present national highway network is grossly inadequate to meet traffic requirements. First, the present route length constitutes only 6 per cent of the total surfaced road length of the country, while it carries an estimated 25 to 30 per cent of total road traffic. Secondly, 37 per cent is still single-lane route length while traffic intensity on some important sections requires double or even multi-laning, particularly at the approach to the cities. Thirdly, culverts, bridges (about 2500 bridges were deficient as on 1st April, 1978) and cross-drainages in several sections are reported to be narrow and weak. Road and bridge works for improvement of low-grade sections, widening and construction of approaches to bridges included in the earlier Plans, have not been taken up due to inadequate financial allocations. Fourthly, efficiency of these highways, particularly of single-lane sections, is severely limited by frequent interruptions caused by slowmoving traffic and by a large number of road inter-sections. During our travels by road and from evidence placed before us, we are convinced that the existing national highway network is grossly inadequate in route length, width, crust thickness and quality of roads and is, therefore, not being optimally used. We recommend that the existing network should be suitably strengthened by improvement of pavement thickness, construction of bypasses, wherever necessary, double-laning of the remaining 37 per cent route length barring such sections where traffic is minimal and replacement of weak bridges and culverts, so that serviceability of the grid is optimised.

10.3.3 While national highways are deficient in pavement thickness for a single axle load of 8.16 tonnes, overloading by 25 per cent of 7.5 tonne vehicles allowed since 1953, and unauthorised over-loading over and above this, is reported to have resulted in plying of vehicles with a single axle load of 10 tonnes or more.

*"Stage construction" process implies that minimum specifications are adhered to for meeting immediate traffic needs. Further improvements are carried out in stages in accordance with the growth of traffic.

The heavier load causes two to three times more damage to road pavements than by a standard 8-tonne axle load vehicle, for which roads are designed. In view of this, Ministry of Shipping and Transport recently formulated a proposal for strengthening and upgrading of about 12,000 kms of certain stretches of existing national highways connecting the four cities of Delhi, Bombay, Calcutta and Madras, Delhi-Amritsar section of national highway number 1 and Calcutta-Gauhati-Saikohaghat road at an estimated cost of about Rs. 434 crores to be completed within six years. Since the upkeep of existing national assets is of prime importance, we feel that a selective approach is called for here. We recommend that urgency should be attached to suitably strengthen the surface of selected stretches of national highways as warranted by load, intensity and composition of freight traffic, including that of container traffic on technical considerations; otherwise, existing road assets would be irreparably damaged.

Pavements of National Highways

10.3.4 It has been represented to us that pavements of national highways should be further strengthened to facilitate plying of higher axle-load vehicles. The main arguments advanced for this are that higher capacity vehicles would result in considerable savings in fuel consumption and that such vehicles can be manufactured easily. At present inter-regional freight road traffic which incidentally is nearly 40 per cent of total goods traffic by road, has an average lead of about 350 kms. Long distance goods traffic by and large moves by railways. In the future as well, long-distance freight traffic would predominantly move by railways which are five to six times more energy efficient than road transport. We do not, therefore, see much scope for higher axle-load vehicles for long distance road movement. Moreover, we understand that trailerisation by way of tractor-trailer or truck-trailer combination or both could provide the same carrying capacity as heavier axle-load, single-deck vehicle with much less strain on road pavements. Finally, it is to be ensured that there is no overloading of vehicles leading to repeated demands for further strengthening of pavements. We are, therefore, not convinced of the justification for strengthening the pavements of the entire national highway system, involving large outlays, primarily to cater to traffic of a small number of heavier axle-load vehicles for carrying specialised high value traffic over long distances.

Criteria for Selection of National Highways

10.3.5 Regarding additions to the national highway network, we note that the present criteria for inclusion of a road in this category are that it (a) runs through the length and breath of the country ; (b) connects foreign highways, State capitals, major ports, large industrial and tourist centres; and (c) meets security requirements of the country. While these criteria may be maintained, it would be appropriate if considerations of (i) substantial reduction in travel time and distance between important origin-destination points by about 10 to 15 per cent or more, and (ii) the need for augmenting road network in hilly and backward areas, which are not served by railways, are also taken into account for upgrading a road as a national highway. In our view, reduction in distance and travel time is of crucial importance, as it would bring about economy in oil consumption and consequent reduction in transport costs. The thrust of the strategy for new additions to national highways thus should be network approach and considerations of traffic flows. Any demand for conversion of a state road into a national highway on considerations other than the accepted criteria, however, need not be entertained.

Proposed New Additions

10.3.6 A few important missing links in the present national highway grid and some new direct links for meeting growing traffic demand have been broadly identified by us. Thirty seven such connections, with a total route length of about 13,000 kms costing about Rs. 520 crores have been indicated in annexure 10.3 and in the enclosed map at page 168B. These additions to national highway network include approximately 800 kms of missing links, requiring new construction; the remaining length represents upgrading of existing state roads as national highways. In identifying these routes we have been broadly guided by the additional criteria suggested by us, namely, of reduction of distance and the network

approach. We recommend that the proposal may be considered as a part of the next 20-year plan of road development.

10.4 **Rural Roads**

10.4.1 Rural roads, comprising classified village roads and some of the other district roads, serve as feeders linking villages with each other as well as with the nearest district roads, state or national highways, railway stations and market centres. By and large, classified village roads are fair-weather roads and other district roads are all-weather ones. Development of rural roads received encouragement during the Fifth Plan period as a part of the Minimum Needs Programme with the object of linking all villages having a population of 1,500 and above with an all-weather road. In hilly, tribal or coastal areas the objective was to connect a cluster of villages of matching population. In the Five Year Plan (1978-83) a total allocation of Rs. 800 crores has been proposed for rural road development in the State sector under the Revised Minimum Needs Progromme and another Rs. 275 crores for a special programme of roads in tribal areas. The target is to connect all villages with a population of 1,500 and above and 50 per cent of villages with a population of 1000 to 1,500. Progress of rural road construction has in general been slow, except in States like Punjab and Haryana where a majority of villages have been already connected with all-weather roads. The position of road connection to villages as on 31 March, 1978 with an all-weather and fair-weather road by population categories is indicated in table 10.2.

Table 10.2

Number of Villages Connected with Roads

(Nos)

Population Category	Total No. of villages	No. of villages connected with		No. of Villages still to be connected with	
		All-weather roads	Fair-weather roads	All-weather roads	Any road
1	2	3	4	5	6
1500 and above	69,681	37,729	13,949	31,952	18,003
1000—1500	54,623	22,985	9,816	31,638	21,822
Less than 1000	4,51,632	1,07,925	69,062	3,43,707	2,74,645
Total :	5,75,936	1,68,639	92,827	4,07,297	3,14,470

Source :—*Report of the Working Group on Rural Roads.*

Of the 5.76 lakh villages, only about 29 per cent have an all-weather road link; another 16 per cent have fair-weather road connections. The number of villages which remain to be connected with a road link is 3.14 lakhs and those with an all-weather road link over 4 lakhs, 84 per cent of which have a population of less than 1000.

10.4.2 Keeping in view the magnitude of the task of providing an all-weather road communication to villages, we constituted a Working Group on Rural Roads to study it in depth. The important conclusions and recommendations made in the report of the Working Group are given in annexure 10.4. As more than 4 lakh villages still remain to be connected with an all-weather road the task indeed is formidable. The Working Group has estimated that an outlay of Rs. 11,000 crores (at 1978 prices) will be required to connect all villages by a road. The programme could be phased over a 20-year period, thus requiring an annual provision of Rs. 550 crores. This amount may not be easy to find. However, recognisting the basic need of providing a road communication to all villages within the next 20 years or so, we have considered a few low-cost solutions.

Low Cost Alternatives

10.4.3 The requirement of Rs. 11,000 crore estimated by the Working Group is on the basis of linking all villages according to the population criterion. This figure would change if a network approach is adopted, taking into account not only village population or clusters but also such other important factors as the level of economic activity, existing communication facilities and potential for development. We have given thought to various aspects of rural roads and have come to the conclusion that a rural road should essentially be viewed as a basic infrastructure facility for rural development. We would, therefore, recommend the following approach for rural roads programme :

(i) Intergration of rural roads programme with the Integrated Rural Development Programme (IRDP).

(ii) Tapping supplementary sources of finance in addition to the State Plan resources.

(iii) Network approach and provision of crossdrainages, culverts and improvement of low-grade sections of kutcha roads aimed at providing all-weather communication to smaller villages rather than linking them with pucca roads.

Integration with IRDP

10.4.4 We have considered the feasibility of integrating the rural roads programme with the overall strategy and content of integrated rural development programme recently launched by the Ministry of Rural Reconstruction. The IRDP intends to cover 2,000 out of 5,000 and odd blocks in the country during the 1978-83 plan period, and take up 300 additional blocks every year to cover all the villages in 10 years. We are of the view that integration of the rural roads programme with IRDP would be a rational and correct way of approaching this question. It should not present any administrative problem as recently the nodal responsibility for rural roads programme has been transferred from the Ministry of Shipping & Transport to the Ministry of Rural Reconstruction. The primary advantage of such an integration would be that claims of smaller villages for a road which have little or no alternative facility, would not be ignored, as is likely under the present criteria. By providing an essential communication link to villages on economic justification, an integrated programme will also help in optimising rural development effort.

Supplementary Sources of Finance

10.4.5 Even after integration of roads programme with IRDP the requirement of funds would be colossal. Besides State plan resources, supplementary sources of finance for the programme, therefore, must be fully tapped. We found an interesting example in Andhra Pradesh of encouraging construction and maintenance of rural roads by making it the responsibility of private transport operators, who are allowed to operate bus service on specific rural routes for a period of three to five years without payment of road taxes and permit fees. We commend this method. Further, we understand that provisions recently made in the Income Tax Act (Section 35 CC and 35 CC-A) provide for treating expenditure incurred by private companies on prescribed rural development schemes, including construction and maintenance of rural link roads, as an eligible item of expenditure for income-tax exemption, if this is certified by the competent State authority. We recommend that private transport operators and others should be encouraged to take full advantage of this provision. It is also essential to explore fully the possibility of mobilising voluntary contributions of local people in the form of cash, land and labour.

Other Cost Reduction Possibilities

10.4.6 We would also like to stress the need for preparing in inventory of existing road network in each district which should form the basis for a proper network and sequence planning for connecting or serving villages with roads. Some States like Andhra Pradesh, Gujarat, Karnataka, and Maharashtra have already started preparing taluka-wise road maps and integrating them into district road maps. In our view stock-taking and preparation of district-wise master plans for rural roads must be urgently undertaken in all States because this alone could help in making a realistic assessment of rural roads in the country. Secondly, priority should be given to provision of cross-drainages and culverts on existing kutcha rural roads wherever necessary with a view to opening up villages to traffic throughout the year. Upgrading of such roads to an "all-weather" standard may be the next step. Thus, the emphasis should be to provide road facility to villages through the year by construction of cross-drainages, culverts and improvement of low-grade sections of kutcha roads rather than by laying pucca roads in the first instance. There is also considerable scope for keeping construction cost within limits by adhering to an "all-weather" road standard, with water-bound macadam surface, using to the maximum extent possible locally available road material rather than provide bituminous surfacing.

Impact of Rural Roads on Demand for Diesel

10.4.7 We also considered the impact of a massive rural roads programme on the demand for diesel. Doubtless, there would be some increase in mechanised transport facilities to serve villages, which would in turn increase the demand for diesel. At the same time, improved rural communications through better roads will shorten distances and lead to plying of better and modernised bullock carts. We are of the view that, by and large, bullock carts* will continue to remain the principal means of transport in rural areas for a long time to come, satisfying both economic and social needs. and methods should be devised to ensure that increase in diesel consmption is minimised by encouraging non-mechanised modes of transport for inter-village communication.

Organisational Set-up

10.4.8 We hold the view that the substantial investments required for technical and organisattonal set-up to plan and execute the rural road programme may justify creation of a separate organisation at the State level. Barring Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Manipur, Rajasthan, Punjab, Sikkim and Tamil Nadu, where rural road development is looked after by a single agency, most other States have two or more departments responsible for it, for example, the state public works department, panchayati raj or community development block-agency, agriculture, sugarcane authority and irrigation and forest departments. Further, planning cells and rural engineering departments in the States, with the exception of Andhra Pradesh and Bihar, have either not been set up or are inadequately staffed. In our view if all States have a single agency for planning and execution of rural roads programme, it would facilitate efficient management and effective monitoring.

10.5 State PWD Roads

10.5.1 The State Governments are responsible for construction and maintenance of state highways, major district roads and other district roads in addition to rural roads. We find that the major deficiencies and limitations of State PWD roads are weak bridges and culverts, absence of a system of periodic preparation of road inventories and of network approach, lack of proper alignments and linkages with rural roads, and inadequate monitoring leading to inordinate delays in completion of works, apart from the poor state of their maintenance. It is often contended that these deficiencies are primarily due to financial constraints and lack of appropriate organisational support. As financial outlays involved would, doubtless, be large and we have to live with constraint of resources, investment plans for state roads sought to be drawn up for States, regions and districts separately. For this purpose, careful traffic surveys and forecasts must be conducted to faciliate determination

* Role of bullock carts is dealt with in Chapter 11.

of inter se priority of road schemes under master plans. Such plans should have the same long-term perspective as programmes for agricultural, industrial and power development. Along with formulation of master plans, it would also be necessary to ensure that execution of road projects is effectively monitored to cut down delays and keep costs under control. Finally, we would emphasise that not only objective criteria be adopted for upgraing other district roads into major district roads and state highways in accordance with IRC standards but a system of a regular, five-yearly review should also be introduced on the basis of whieh road improvement plans are formulated and executed through a process of "stage construction" to meet growing traffic needs. Definite norms in this regard may be determined while formulating the next 20-year road development plan.

10.6 Urban and Project Roads

Urban Roads

10.6.1 Roads under the charge of municipalities, notified area committees, Central Public Works Department, Railways, port authorities and Military Engineering Service are classified as "urban" roads. We have observed that land area provided for roads in metropolitan cities is generally inadequate. While it may not be possible to widen roads in the central business districts of metropolitan areas or big cities, we suggest that, in planning for expansion of metropolitan areas, sufficient land should be earmarked for roads as an integral part of master plans for urban development. We have also noted that urban roads are ripped open frequently by various agencies, namcly,the posts & telegraphs, electricity and water and sewage disposal departments, for carrying out their works. We see no reason why it should not be possible to co-ordinate the work of civic service agencies and plan and execute work during the hours when traffic is minimal. It is also essential that road resurfacing is quickly completed after service works. In our view, an arrangement needs to be evolved, if necessary, by a legal provision, under which agencies digging up road surface should be required to defray the full cost of resurfacing it. This would help stop unnecessary ripping up of road surface. In planning for new urban roads, ducts to accommodate cables and pipes should better be laid near footpaths. The incidence of accidents on "urban" roads is quite high because of heavy congestion and mixed type of traffic. We suggest that there should be a statutory obligation requiring the urban authorities or local bodies to spend adequate proportion of financial allocations for roads on provision of footpaths, guard rails and cycle tracks.

ProjectR oads

10.6.2 Roads under State irrigation, forest, electricity, sugarcane departments and the Coal Mines Authority are classified as project roads. While some of these roads are exclusively used by project authorities, most of them cater to both project and general traffic. We find that many project roads of the latter type are not built according to standards warranted by general traffic requirements and are poorly maintained. It is essential that project authorities develop these roads according to IRC standards of other district roads, major district roads or even state highways, depending upon traffic needs. In our view, it should not be difficult to apportion financial and administrative responsibilities to the concerned project authorities and State PWDs. Wherever necessary, State Governments may also give grants to project authorities for upkeep of such project roads as are used for general traffic.

Coalfield Roads

10.6.3 Road network in and around coalfields broadly comprises (i) haul roads located within mine areas and colliery townships, and (ii) feeder and approach roads connecting collieeries with railway sidings or with highways. Presintly, Coal India and its subsidiaries own and mantain about 480 kms of metalled roads and 1,260 kms of kutcha roads. In addition, the subsidiaries use nearly 1,380 kms of feeder and approach roads in coalfield areas, which belong to the State PWDs, mines boards and zila parishads. For the latter category of roads the concerned authorities collect cess on coal despatches and are responsible for their development and maintenance. We gather that in 1977-78 an estimated 16 m. tonnes of coal moved by road transport. In addition, about 12m. tonnes of coal moved over a distance of three to five kms on internal . roads within collieries, namely, from pitheads to railway sidings. The condition of roads in coalfield areas

and feeder and approach roads maintained by agencies other than Coal India and its subsidiaries is stated to be extremely poor. To improve matters, a suggestion has been made that a single agency should be constituted and entrusted with the responsibility for development and maintenance of all roads within coal-field areas, instead of the present multiple agencies. However, it appears to us that unless the proposed single agency is provided with adequate funds by transfer of entire proceeds of coal cess and the requisite authority to maintain these roads, it may not achieve the desired results. Considering the crucial importance of coal transport in national economy, we would strongly urge State Gevernments to pay special attention to upkeep of these roads, assuming direct responsibility for maintenance of feeder and approach roads and earmark the entire proceeds of coal cess and other levies for this purpose. In case, the revenue so earned falls short of maintenance requirements, a suitable increase in the rate of coal cess or other levies may be considered by State Governments.

10.7 Encroachment on Highways

10.7.1 During our visits to States, we found that shops, workshops and even dwellings have spread over the land abutting highways. particularly in the periphery of urban areas. Sometimes such encroachments are made not only on footpaths but even on road carriageways, thereby reducing the effective road width. This has become a serious hazard to motor traffic in the country. Strict measures should be taken by the State Governments and local authorities against such encroachments.

10.7.2 We learn that a few State Governments have passed laws for prevention of ribbon development alongside roads. But the law is not being strictly enforced. For national highways, a similar legislation has been under consideration of the Ministry of Shipping and Transport, but it has not been possible to go ahead with it owing to reservations of some State Governments in this regard. The State Governments seem to feel that the proposed Central law would confer rights of control of land-use alongside national highways (on land belonging to the States), to the Central Government. Since even the work of construction and maintenance of national highways (the responsibility of the Centre) is being actually executed by the State Governments, we see no reason why the latter should object to the Union Government assuming appropriate legal powers to prevent such encroachments along national highways since the enforcement in any case will be with the State Governments. In our view, prevention of encroachments and ribbon development should receive urgent attention particularly along national and state highways and bypasses around congested localities, where traffic intensity is high. For this purpose it is essential that the Union Government as well as all the State Governments assume necessary legal powers and strictly enforce the law in the interest of safety and efficiency of road movements.

10.8 Maintenance of Roads

10.8.1 Road maintenance prolongs road life and facilitates regularity, punctuality and safety of transport services. A paved road surface in a reasonably good condition also saves on fuel consumption and wear and tear of vehicles, thus reducing operational costs. A badly maintained road increases fuel consumption, wear and tear of vehicles and the frequency of road accidents. Road maintenance is categorised broadly as follows :

i) Routine day-to-day maintenance of road width, structure, road signs etc,

ii) Periodical renewal of surface, and

iii) Special repairs necessitated by floods, landslides, storms, and natural calamities.

While the first two categories are in the nature of regular routine maintenance, the third relates to special and occasional maintenance works. Road development, a capital work, is financed from plan allocations, but maintenance expenditure is met out of non-plan revenue budgets.

10.8,2 Since maintenance provisions for state roads are a charge on their revenue budgets, successive Finance Commissions provide for maintenance of assets in their revenue and expnditure forecasts. The Seventh Finance Commission estimated total maintenance requirements for the five year period 1979-84 at around Rs. 1361 crores for state roads and Rs. 430 crores for roads

of local bodies. These forecasts are based on prevalent maintenance norms. The actual road maintenance provision varies from year to year, depending on resource position of State Governments.

Maintenance Norms

10.8.3 Maintenance norms for roads, as in vogue now, are based on the recommendations of the Report of the Technical Group on Norms of Maintenance for National and State Highways (1968) and of the Malhotra Committee Report (1968) for major district roads, other districts roads, and village roads, constituted by the Ministry of Shipping and Transport. The range of maintenance norms for roads prescribed by the Ministry of Shipping and Transport is shown in table 10.3

Table 10.3

Maintenance Norms for Roads (1978)

Road Category		Rs. per km.		
National highways	Single lane	6700	to	16000
	Double lane	8000	to	25000
State highways		6000	to	15000
Major district roads		4000	to	15000
Other district roads		3000	to	14000

In the absence of relevant data for state roads, it is not possible to relate the actual expenditure incurred by State Governments on maintenance of roads with prescribed norms and to draw any meaningful conclusion. However, in respect of national highways, the trends in per km maintenance cost, worked out on an average basis, are shown in table 10.4.

Table 10.4

Maintenance Expenditure on National Highways

Year	Maintenance Expenditure (Rs. per km)
1951-52	1813
1961-62	2573
1976-77	8742
1977-78	9585

Source : *Ministry of Shipping and Transport (DTR)*

Note : Expenditure figures have been worked out by dividing lhe maintenanee expenditure figure of the current year with the road-length figure of the previous year.

But data given in table 10.4 has serious limitations, as it clubs the maintenance expenditure incurred on both single and two-lane national highways (separate data are not readily available) and as it is an average based on the entire road length. All the same, rough estimates of maintenance expenditure per km of national highways are nearer the lower ranges of the prescribed norms.

10.8.4 During our visits to States, we found that roads, including national highway, are poorly maintained. We were told by State representatives that the main reason for such poor maintenance was inadequate financial allocation. As a result of bad mainrenance, road standards have deteriorated substantially. Bad roads not only lead to sub-optimal utilisation of road system but add to vehicle operating costs, travel time and accident rate. We, therefore, stress that priority should be given to road maintenance. It is essential that maintenance norms for roads in States are periodically updated, taking into account rising costs. Since roads are invaluable national assets, financial allocations for their maintenance must be made strictly in accordance with prescribed norms. We are of the firm view that road maintenance should be accorded a higher priority than new construction, and there should be a major policy shift in favour of road maintenance both in terms of financial allocation and organisational efforts.

10.9 Finance for Road Development

10.9.1 The Central Government wholly finances construction and maintenance of national highways and strategic and border roads. The Union Government also provides ffnancial assistance to States for road and bridge projects of inter-State or economic importance and special road/bridge works of national significance. Construction and maintenance of all the other categories of roads is the responsibility of State Governments and local bodies.

10.10 Central Road Fund

10.10.1 The Central Road Fund (CRF) was created in 1929 as a non-lapsable fund to augment limited financial resources of the then provincial government and local bodies for development of

state roads. Presently, the CRF derives its revenue at the rate of 3.5 paise per litre out of proceeds of excise and customs duties levied on taxed motor spirit. Of the total accruals to CRF, 80 per cent is allocated to State Governments on the basis of actual consumption of petrol within their territories and 20 per cent to the CRF (Ordinary) Reserve. The cost of administering the account is met out of the CRF (Ordinary) Reserve. The entire CRF (Allocations) Account (80 per cent of total) and balance of the CRF (Ordinary) Reserve, after meeting the cost of administration, is expected to be utilised on schemes approved by the Central Government relating to road research and intelligence, traffic and economic surveys, training of young engineers, schemes of all-India importance, and making part contribution to programmes for building driver's and conductors' rest places, and wayside amenties on state roads. We understand that the annual CRF accruals are currently around Rs.8 crores and a variety of schemes, ranging from construction of road and bridge works in tribal and backward areas and inter-State works, to schemes for research and surveys, training of engineers and purchase of machinery have actually been financed from this fund. The Ministry of Shipping and Transport has pointed out that accruals are much less compared to requirement of funds and that the fund should be augmented by bringing within its purview high speed diesel also. On the other hand, it has been argued that the circumstances leading to creation of CRF in 1929 are no longer relevant in the context of planned economic development and that such a method of funding road works is a distortion in the planning process. In any case, the significance of CRF has steadily declined; expenditure on road development financed through this fund as a proporation of total expenditure on roads has fallen from 11 per cent in 1951-52 to 3.8 per cent in 1961-62 and only 0.9 per cent in 1976-77.

10.10.2 We are of the view that planning process is not necessarily vitiated because, in formulating plan schemes, due account is taken of works funded from CRF. Moreover, it would be advantageous to continue the present pattern of funding from CRF those road development schemes which are likely to be lost sight of in the general planning process. We, therefore, do not see any particular advantage in abolition of CRF. At the same time, we do not favour inclusion of high speed diesel tax for accural to it. We recommend that its coverage should be confined to schemes of road research, training of engineers, traffic surveys and provision of wayside amenties only.

10.11 Research and Development (R&D)

10.11.1 Road research and development effort at the Central level is primarily the responsibility of the Central Road Research Institute (CRRI), attached to the Ministry of Shipping and Transport. In the States, R&D is undertaken by the state testing and quality control laboratories for road and bridge works attached with the respective State P. W. Ds. All States do not have such laboratories. The Committee on Transport Policy and Co-ordination had recommended improvement of technical framework for sustaining road system quality in the country. These included setting up of a highway reseach board at the Centre, separate highway departments in States, and testing and quality control laboratories for road and bridge works in the States under the aegis of CRRI. It also recommended creation of mobile field laboratories for on-the-spot testing and quality control as well as extensive survey and systematic testing of local road builaing materials. We gather that the Ministry of Shipping and Transport has recently started a scheme of financial assistance from out of CRF for augmenting mobile field laboratories, but adequate attention does not seem to have been given to this in most States. The result is that road construction costs have been continually rising and locally available road building materials are not being identified and used optimally. In view of this, we emphasise that not only schemes of finanncial assistance to States for augmenting mobile field laboratories should be effectively pursued but a further systematic effort should also be made to strengthen road research programmes. We recommend that five or six regional laboratortes, on the pattern of agricultural research centres which function under the aegis of the Indian Council of Agricultural Research, may be established. The proposed regional laboratories should function under CRRI and their research programmes geared to evolution of appropriate standards for all-weather rural roads by identifying locally available cheap road-building materials. In our view, R&D effort could mainly be financed from CRF. Lastly, we recommend that appropriate incentives, such as grants and loans, be provided to the pri-

vate sector for R&D to encourage concerted effort in designing new processes and applying them to road development programmes.

10.12 Summing Up

10.12.1 Roads being a very important means of surface transport and an integral part of the national transport system, we attach priority to the adequacy, proper upkeep and optimum utilisation of the road system. The national highway grid, which forms about 6 per cent of the surfaced road length in the country but carries over 25 per cent of road traffic, appears to us grossly inadequate both in terms of route length and load-carrying capacity. Therefore, we stress on the urgency of selective addition to its route length, strengthening of pavement thickness and construction of by passes where necessary, double-laning of entire route length, multi-laning of selected approaches to cities and replacement of weak bridges and culverts. In the interest of effective planning and proper upkeep of the road system, road and bridge inventories must be prepared for all categories of roads, particularly for the major categories, namely, national and state highways and major district roads. It is also important that such inventories are regularly updated every five years.

10.12.2 We have found that roads including national highways are poorly maintained for want of adequate financial allocations. Poor condition of roads not only adds to vehicle operating costs and social costs, but also leads to sub-optimal utilisation of the road system. We, therefore, consider that the highest priority should be attached to road maintenance even in preference to new construction. It is essential that road maintenance norms are periodically updated taking into account rising costs and adequate financial allocation for maintenance are made by the State Governments strictly in accordance with prescribed norms.

10.12.3 Regarding rural roads progromme, we are of the opinion that a rural road has essentially to be viewed as a baisc infra-structure for rural development. Accordingly, we favour integration of rural roads programme with the integrated rural development programme. The integration proposed by us will not only help in optimising rural development effort but will also rationalise the criteria for selection of villages to be connected with roads. Under the present population criteria of selection, some of the smaller villages, where the road is "a must" in the absence of any other means of communication, get ignored. Since rural roads programme would involve large outlays, we stress on the need to find low-cost solutions. We suggest that possibilities of tapping supplementary sources of finance like voluntary contribution from the villagers and encouragement to private transporters to invest on rural roads throuhg provision of tax concession may be fully explored. It is also essential that an inventory of existing road network in each district is prepared, which should form the basis for a proper network and sequence planning for connecting villages with roads. This will help in making a realistic assessment of financial requirements for the programme. The thrust of policy in rural road programme, in our view, should be to provide urgently road facility to as large a number of villages as possible, throughout the year by construction of cross-drainages, culverts and improvement of low grade sections of kutcha roads, rather than by laying pucca roads in the first instance.

10.12.4 Finally, since transport of coal is of crucial importance to the national economy, we strongly urge the State Governments to pay special attention to upkeep of feeder and approach roads in the coalfield areas, if necessary, by assuming direct responsibility for their maintenance.

Functions of different categories of roads as described in the Bombay Plan and Indian Roads Congress standards and specifications for each of them.

A. Functions :

(i) *National Highways* are the principal arterial routes connecting the Union capital with the State capitals, major ports and various highways and meet the strategic needs of the defence of the country;

(ii) *State Highways* connect State capitals with district headquarters and important cities and towns within the State, the National Highway and the highways of the adjacent States and meet the needs of the traffic to and from the districts;

(iii) *District Roads* take the traffic from the main roads to the interior of each district and rural area and to smaller units. They connect the areas of production and markets each with the other as well as with the other highways and railways. They are sub-classified into Major District Roads (MDRs) which are metalled roads and have a higher standard and specification, and Other District Roads (ODRs) which are of relatively lower specification and design; and

(iv) *Classified Village Roads* connect villages or groups of villages with each other and the nearest district roads and other main highways, railway stations and river ghats. These roads form the basic infra-structure in the matter of linkages to villages and rural areas.

(v) *Unclassified Village Roads* : There are unclassified village roads which are mostly earthen roads and are of much lower standard and would in most cases be tracks in the rural areas.

B. IRC Specifications and Standards :

(i) *Expressways** should be divided highways, fit for all-weather use, and should have atleast four-lane modern type surface, (i.e. bituminous or concrete surface) with controlled access and grade separation at all road and rail crossings. The bridges should be designed for the highest I.R.C. loading.

(ii) *National Highways & State Highways* should be suitable for all-weather use and should have modern type surface. Access to these roads should be limited and where necessary, parallel service roads should be provided for local traffic. All bridges and culverts which cannot carry atleast I.R.C. class 'B' loading should be strengthened or replaced. All new bridges and culverts should conform to the prescribed highest IRC loading. The width of pavements may be decided on the basis of the traffic requirements.

(iii) *Major District Roads* should be suitable for all-weather use and have at least a metalled single lane carriage-way. The type of surface will depend upon the needs of the traffic. All new bridges may be designed for the prescribed highest I.R.C. loading.

(iv) *Other District Roads* should be suitable for all-weather use except at major river crossings where low level structures or ferries may be provided. The carriage-way width should have single lane width and may be of low cost type such as stabilised soil or gravel. All bridges and culverts should be designed for I.R.C. class 'B' loading.

(v) *Classified Village Roads* should have raised formation with adequate land width. They should be provided with culverts over all small streams and have cause-way over minor river crossings where major bridges will not normally be provided. These roads may have a single lane carriage-way width with low cost stabilised soil or gravel.

*Expressways are not prevalent in India.

Indian Roads Congress Standards for Roads

A. Carriageway Width

(In Metres)

	Roads	*Bridges*
Standard single-lane	3.75	4.25
Standard double lane	7.00	7.50
Standard multi-lane	3.50 per lane	7.50 for each 2 lane
Intermediate width roads	5.50	7.50
Village roads single-lane	3.00	for bridges of more than 6 metre span on Other District Roads & Village Roads clear width of road way : Desirable ... 7.50 where 7.50 not feasible 5.75 Exceptional cases ... 4.25

B. Capacity*

(In Passenger Car Units)

Single lane roads 3.75 m wide width earthen shoulders. ...	1000 PCUs/per day
Single lane roads 3.75 m wide with adequately designed shoulders minimum 1 m width on either side. ...	2500 ,,
Two lane roads with minimum 1 m shoulders ...	10000 ,,
Roads of intermediate width 5.5 m ...	5000 ,,

*For calculating capacity in PCUs, the equivalency factors are as given below :—

(1) Passenger car, tempo, auto rickshaw and agricultural tractors. ... 1.0

(2) Motor cycle/scooter/cycles. ... 0.5

(3) Truck, bus, agricultural tractor-trailer unit. ... 3.0

(4) Cycle rickshaw ... 1.5

(5) Horse drawn vehicle ... 4.0

(6) Bullock chart smaller ... 6.0

(7) Bullock cart bigger ... 8.0

These standards are applicable in rural areas where there are no restrictions on visibility and no lateral obstructions within 1.75 m. from edge of pavement. These are also based on the assumption that a nominal amount of animal drawn vehicles (say 5—10 per cent) is present in the traffic stream duing peak hours.

The capacity figures are also based on the assumption that traffic in peak hour is about 12 per cent of average daily volume of traffic.

Suggested list of Routes and Direct Connections for Addition to the National Highway System

Sl. No.	Region and Route	Route Length (kms)
1	2	3
	Northern Region	
1.	Pilibhit-Hardwar-Paonta-Nahan-Ambala	475
2.	Pathankot-Mandi	220
3.	Ambala-Kaithal-Hissar-Biramsar	410
4.	Chandigarh-Bhatinda	225
5.	Palwal-Rewari-Hissar	251
	Central Region	
6.	Ghaziabad-Meerut-Hardwar	190
7.	Gwalior-Jhansi-Khajuraho-Rewa	460
8.	Nagpur-Baidullaganj (to Bhopal)	350
9.	Jabalpur-Shahdol-Ambikpur-Gumla	520
10.	Gorakhpur-Nautanwa	84
11.	Raipur-Varanasi	620
	Eastern Region	
12.	Lateral Road (Bareilly-Amingaon) including Darbhanga-Forbesganj Link	1,050
13.	Ghazipur-Ballia-Chhapra-Hajipur	210
14.	Kharagpur-Balasore	125
15.	Berhampur-Raipur	550
16.	Mokameh-Farakka	310
17.	Asansol-Kharagpur	180
18.	Arrah-Buxar	80
19.	Patna-Muzaffarpur-Sonbarsa	160
20.	Kora-Katihar-Harishchandapur-Farakka	95
	North Eastern Region	
21.	Imphal-Silchar-Badarpur	300
22.	Silchar-Aizawal-Lunglei	400
23.	Link to Itanagar	25
24.	North Trunk Road (Gauhati-Passighat-Tezu-Saikohaghat)	625
25.	Paikan-Tura-Dalu	150

Annexure 10.3 (Contd)

Annexure 10.3 (Concld.)

1	2		3
	Western Region		
26.	Ajmer-Bikaner		290
27.	Kolhapur-Ratnagiri		130
28.	Beawar-Sirohi-Radhanpur (to Kandla)		450
29.	Baroda (Vadodra)-Dhulia-Sholapur		760
30.	Ahmedabad-Indore-Dewas-Bhopal		510
31.	Jaipur-Kota-Biaora (to Bhopal)		450
	Sothern Region		
32.	Cochin-Madurai		280
33.	Karwar-Hubli-Gooty-Nellore		790
34.	Bangalore-Mysore-Calicut (Kozhikode)		360
35.	Rajahmundary-Jagdalpur		340
36.	Nizamabad-Jagdalpur		460
37.	Vijayawada-Machulipatanam		70
		Total	12,955 kms

Important Conclusions and Recommendations made by the Working Group on Rural Roads

1. Rural development has become a matter of growing urgency for considerations of social justice, national integration and economic uplift. Rural roads provide one of the key infra-structures for integrated rural development.

2. Being highly labour intensive production work, rural roads would make a significant contribution to creating jobs for the unskilled labour.

3. The present accessibility level of villages to roads is low. Out of 5.76 lakh villages in the country, about 1.69 lakh village have all-weather road connections and another 93,000 have fair-weather road connections without adequate cross-drainage structures. Position in case of villages of higher population sizes is better when compared to small size villages. There are also wide variations of accessibility amongst different States—Haryana, Punjab, Tamil Nadu and Andhra Pradesh being in an improved situation and the hilly States and the States of U.P., Gujarat, M.P., Orissa, Bihar lagging behind considerably.

4. There is approximately 5 lakh km of rural roads in the country as on 31.3.1978, of which about 1.5 lakh km have bituminous surfacing. Ia addition, there are 4 lakh km of rural roads constructed under the Community Development and National Extension Schemes etc. which are mostly earth roads.

5. In the past, some provision for rural roads was made in the Central Sector as part of various centrally sponsored schemes notably Crash Scheme for Rural Employment, Drought Prone Area Programme, Command Area Development Scheme, Food for Work Programme, Tribal Area Development Project with the objective of supplementing the programme in the State Sector.

6. It would not be feasible to bring each and every village in the country on the road network in the near future. Our overall aim should be that on an average, a village is not more than 1.6 km. from a road by the turn of the century.

7. In hill areas having villages at comparatively higher altitudes, it may be advisable to take the road upto a point as far as economically possible and thereafter an improved bridle path or jeepable road may be provided.

8. Since the cost of providing black top surfacing would be high, good quality locally available road metal may be used as a base course with suitable filler/binder material to durable water bound macadam surface.

9. Generally, the rural roads should be single lane in carriageway 3.75 metre wide in case of Other District Roads and 3 metre wide in case of Village Roads.

13. High priority may be given to the provision of adequate cross-drainages in the form of bridges, culverts and causeways.

11. The per km cost of construction would vary from Rs. 90,000 to Rs. 2.7 lakhs for ODR and Rs. 50,000 to Rs. 2.7 lakhs for village roads. The estimated overall investment to serve all villages with roads would be Rs. 11,000 crores to be phased out over 20 years.

12. In executing the Rural Roads Programme, it may be kept in view that (a) the alignment should be determined in a manner to link largest number of villages and maximum population, (b) the Rural Road Authorities should draw district plans indicating the alignment of rural roads and other road network, and (c) in the first instance, only metalled road may be provided, black topping to be taken up sparingly.

13. Proper level of maintenance should be ensured and rational maintanance criteria laid down for rural roads to be up-dated regularly. Simple procedures should be prescribed and the field staff be provided with simple tools.

(Annexure 10.4 contd.)

(Annexure 10.4 concld.)

14. In addition to State Plan allocation, special funds such as Market Committee Funds Scheme, Krishi Upajmandi Scheme etc., may be created.

15. Sample studies may be periodically undertaken to assess the socio-economic effects of rural roads in quantative terms.

16. Labour intensive technology with a blend of machine only for items where equipment use is absolutely essential, such as for compaction of earthwork, consolidalion of pavement etc,. may be adopted.

17. Typical sections of the rural roads in regard to availability and use of road-making machinery, implements and tools, etc. may be studied for future guidance.

18. Although rural roads fall within the State sphere of activity, there are several aspects relating to rural roads which would need constant attention of the Central Government for ensuring proper co-ordination and arriving at national level guidelines and policy. The creation of a Rural Roads Commission at the Centre would go a long way in providing the central co-ordinating agency at the national level. Pending this, creation of a Cell headed by a Chief Engineer in the Ministry of Shipping & Transport or in the Planning Commission to take care of co-ordination, planning policies on technical specifications and standards and keeping a tag on the progress of rural roads development on a broad basis is considered necessary.

Chapter 11

Road Transport

11.1 Introduction

11.1.1 In the surface transport system of India, both for movement of passengers and goods, road transport is of crucial importance. There is a wide variety of mechanised and non-mechanised vehicles in the country for road traffic which provides some choice to people to travel and transport goods according to their requirements and paying capacity. The vehicles include hand-driven and animal-drawn carts, bicycles and bicycle rickshaws, horse carriages, tongas, and different power-driven two and three wheelers, like scooters, rickshaws, motor cycles, auto-rickshaws, mopeds, motor cars, buses, minibuses, trucks, tempos, trams, trolley buses, and articulated vehicles. Motor transport efficiency depends on a good road system, in addition to quality vehicles, adequate repair cover and supply of fuel which is petroleum products. In view of the characteristics of easy availability and flexibility of operation, adaptability to individual needs, door-to-door service and reliability, road transport is ideally suitable for short and medium distances, except for bulk movement of goods and mass transit of passengers. Motor transport is also the main mechanised means of transport in hilly and rural areas not served by railways. Further, roads and road transport provide one of the basic infrastructures for economic development of backward areas and serve as a feeder service to rail traffic, ports and harbours. In 1977-78, mechanised road transport handled an estimated 77 b. tkm and 250 b. pkm freight and passenger traffic respectively. We envisage that by 2000-01 A.D. this traffic would increase to 182b. tkm and 800 b. pkm.

11.2 Growth in Motor Vehicle Population

11.2.1 Since 1951 motor transport has made considerable progress both in public and private sectors. Firm data on the number of animal-drawn and hand-driven carts, bicycles and cycle rickshaws, and tongas in the country as a whole are not available. According to an estimate made by the Indian Institute of Management, Bangalore, there are 15.18 m. animal-drawn carts in India. The present number of bicycles in the country is estimated at 23 m. taking into account production data and assuming an average life of a bicycle at 10 years. The growth of motor vehicles by type of vehicles registered since 1950-51, all of which have to be licensed and registered under the Motor Vehicles Act, is given at annexure 11.1 These data show that the total number of registered motor vehicles incresed more than two-fold in ten years, that is, from 3.06 lakh vehicles in 1950-51 to 6.65 lakh vehicles in 1960-61. In the next ten years the number nearly trebled to 18.65 lakh. At the end of 1977-78, the number of registered motor vehicles stood at 32.36 lakh, over 10 times the number registered in 1950-51. The growth of motor vehicles since 1950-51 by broad categories is indicated in table 11.1.

(Table 11.1 on next page)

Table 11.1

Growth of Registered Motor Vehicles

(In lakh Nos.)

Year	Cars, Jeeps & Taxis	Buses	Trucks	Two and three wheelers	Other Vehicles	All Motor Vehicles
1	2	3	4	5	6	7
1950-51	1.59* (52%)	0.34 (11%)	0.82 (27%)	0.27** (8.8%)	0.04 (1.2%)	3.06 (100%)
1960-61	3.09 (46.5%)	0.57 (8.6%)	1.68 (25.3%)	0.95 (14.2%)	0.36 (5.4%)	6.65 (100%)
1977-78	8.46 (26.2%)	1.17 (3.6%)	3.68 (11.4%)	15.09 (46.6%)	3.94 (12.2%)	32.36 (100%)

Source : Ministry of Shipping and Transport, DTR. * Excludes Jeeps ** Excludes three-wheelers

As against a ten-fold increase in the total number of motor vehicles over 27 years ending 1977-78, the number of passenger cars, jeeps and taxis, which predominantly use petrol as fuel, increased by five times. The number of buses and trucks rose over the same period by three-and-a-half times and four-and-a-half times respectively. There was, however, a phenomental increase in the number of two-wheelers, three-wheelers and other vehicles, such as tractors, trailers, pick-up and delivery vans and public-owned vehicles. The number of two wheelers alone increased phenomenally from 26,860 in 1950-51 to 13.96 lakh in 1977-78, or over 50 times in 27 years. The number of two and three wheelers taken together increased from 95,000 in 1960-61 to 15.09 lakhs in 1977-78, about 17 times in 17 years. In 1977-78, two and three wheelers accounted for nearly half of total registered motor vehicles, against no more than 9 per cent in 1950-51 and 14 per cent in 1960-61. Consequently, the share of buses and trucks in total motor vehicles declined from 38 per cent in 1950-51 to 15 per cent in 1977-78. Similarly, the share of cars, jeeps and taxis also declined from 52 per cent in 1950-51 to 26 per cent in 1977-78, even though in absolute numbers they increased substantially.

Motor Vehicle Density

11.2.2 It will be useful here to study the co-relation between growth in human population, surfaced road length and motor vehicles during the 27 years ending 1977-78. In absolute terms, while motor vehicles registered a ten-fold increase, surfaced road-length rose by three-and- a-half times (from 1.56 lakh km in 1950-51 to about 5.5 lakh kms. in 1977-78) and human population by less than two times from 361 m. in 1951 to an estimated 634 m. in March 1978. Data on growth in motor vehicle density per lakh of human population and per 100 km of the surfaced road-length are given in table 11.2 .

Table 11.2

Motor Vehicle Density

Year	No. of Motor Vehicles per lakh of human population			No. of Motor Vehicles per 100 km of surfaced roads		
	All motor vehicles	Buses	Trucks	All motor vehicles	Buses	Trucks
1	2	3	4	5	6	7
1950-51	85	9.5	22.6	196	22.0	52.5
1960-61	150	12.9	38.0	283	24.2	71.5
1971-72	363	17.6	64.7	482	23.4	85.7
1975-76	437	17.4	56.4	489	19.5	63.0
1977-78	510	18.5	58.1	593	21.5	67.4

Source : Primary data from Ministry of Shipping and Transport (DTR).

These data show that all-motor vehicle density per lakh of population has increased six times, as against growth of human population by less than two times. This is due to phenomenal growth in personalised transport vehicles, such as two and three wheelers, jeeps and other miscellaneous vehicles following intensive growth in economic activity and an appreciable rise in levels of living. The density of commercial vehicles (buses and trucks) in the same period, however, increased by two to two-and-a-half times only. All motor vehicles density registered a three-fold increase in these 27 years, as against a three-and-a-half times increase in surfaced road-length. The relatively faster growth of road-length confirms the need for creation of transport capacity ahead of demand. Secondly, as density of buses has virtually stagnated, with only a small increase in that of trucks per 100 km of surfaced road length, it could be taken to indicate that there is considerable scope for utilisation of road capacity particularly outside metropolitan or large urban centres.

11.3 Share of Road Transport in Total Traffic

11.3.1 During the twenty seven years ending 1977-78, there has been an increase in the share of road transport in total traffic, both for passenger and goods movements. Table 11.3 reproduces trends in the share of total traffic by rail and road transport from 1950-51 to 1977-78 in percentage terms.

Table 11.3

Share of Road and Rail Transport in Passenger and Freight Traffic-Based on Passenger Kms. (PKM) and Tonne Kms. (TKM)

(Percentages)

Year	Passenger Traffic		Freight traffic	
	Road	Rail	Road	Rail
1	2	3	4	5
1950-51	26	74	11	89
1960-61	42	58	28	72
1970-71	59	41	34	66
1973-74	60	40	35	65
1977-78	59	41	32	68

The share of road transport in passenger traffic increased from 26 per cent in 1950-51 to 59 per cent in 1977-78, with a corresponding decline in rail share, primarily because of introduction of inter-city and inter-district bus services by public sector road transport undertakings. In freight traffic too, the share of road transport increased but relatively slowly. Since 1970-71 the relative shares of two modes, both in regard to passenger and goods movements, appear to have stabilised.

11.4 Ownership Pattern of Commercial Vehicles

11.4.1 Out of 117,449 registered buses as on 31 march, 1978, 58,128 or 49.5 per cent are owned by the 48 public sector road transport undertakings. The remaining 50.5 per cent or 59,321 buses are owned by private operators. Ownership of trucks is predominantly in private sector, the nationalised sector accounting for only 0.5 per cent or 1 827 trucks out of the total of 368,193 trucks registered in 1977-78. Trends in ownership of buses and trucks by private and public sectors since 1960-61 may be seen in table 11.4.

Table 11.4

Ownership Pattern of Buses and Trucks by Private and Public Sectors since 1960-61

(Figures in Nos./Percentages)

Year	Total No. of buses	Percentage Ownership (Buses)		Total No. of Trucks	Percentage Ownership (Trucks)	
		Public Sector	Private Sector		Public Sector	Private Sector
1	2	3	4	5	6	7
1960-61	56792	31.6	68.4	167649	0.7	99.3
1965-66	73175	36.2	63.8	258977	0.7	99.3
1970-71	93907	39.5	60.5	342577	0.9	99.1
1975-76	106349	49.0	51.0	344093	0.6	99.4
1976-77	116939	47.9	52.1	367202	0.5	99.5
1977-78	117449	49.5	50.5	368193	0.5	99.5

Source : Primary data from Ministry of Shipping and Transport (DTR) and Association of State Road Transport Undertakings.

Trucking Industry

11.4.2 Up to-date data on ownership pattern of trucks which are predominantly in private sector, are not available. But figures for 1971-72 show that 88.9 per cent of trucking firms owned one vehicle, 9.2 per cent two to five vehicles, and 1.2 per cent six to ten trucks. Only 0.7 per cent of private agencies owned more than ten trucks. Further, only a handful of trucking firms owned more than 100 trucks. The existence of a large number of single-truck owners has resulted in multiplicity of transport companies, transport agents, brokers and booking agencies which link transport user and truck owner. We understand that reorganisation of this industry was examined in the past by the Committee on Transport Policy and Co-ordination in 1966, and by a Study Group on Viable Units set up by the Ministry of Shipping and Transport in 1967. Both committees considered a single truck firms as not viable, and held the view that a viable unit should consist of at least ten trucks. The Study Group suggested that appropriate incentives may be provided to individual single-truck owners to organise themselves into either registered associations or co-operative

societies for common facilities like servicing and repair of vehicles, booking and forwarding of goods and other functions to ensure efficient and economic operation and avoid exploitation by middlemen. We gather that little progress has been made in this regard and that, by and large, State Governments have not extended incentives to them for this purpose. Even in a few States where transport operators' co-operatives were set up the trend has not been encouraging.

11.4.3 We examined this in detail and have come to the conclusion that there is no reliable evidence to prove that a single truck operator is not a viable unit. Actually, trucking industry in its present structure has not only survived but has prospered. The Working Group on Transport Pricing, Taxation and Subsidy set up by us has observed that profitability rates of small operators (owning one bus or two or three trucks) generally ranged between 20 to 40 per cent on capital invested while, in some years, the rate of return was even 70 per cent. The Working Group has also brought out that even small operators, who buy old vehicles with an investment of Rs. 15,000, make a net profit of about Rs 5,000 per annum, thus securing a return of 30 per cent. Evidently, this has been possible due to steady growth in demand for transport of goods by road. Further, we have also not come across any definite evidence to show that goods booking agencies have been exploiting small operators. On the contrary, it would appear that these agencies have performed their role well vis-a-vis single-truck owners in collecting, forwarding and distributing goods to be carried by the latter. Some of these agencies have also been providing finance and godown facility, even though, in a few cases, the interest rate charged by them might have been quite high. We would revert to the subject of regulation of goods booking agencies later. Since the present structure of trucking industry has worked well and it has prospered, we see no case for its reorganisation. We would, however, like to add that problems faced by single truck operators, such us inadequacy of working capital, motor spare parts, batteries, tyres and tubes and workshop cover, should be examined.

11.5 Constitutional Provision and System of Regulation

11.5.1 Executive responsibility for road transport vests with State Governments under the proviso to Article 73 (1) of the Constitution of India read with Entry 35 in the Concurrent List (list III) of its Seventh Schedule. According to the Seventh Schedule, communication, that is, roads and bridges (barring national highways which fall under the Union List,) ferries, tramways ropeways and vehicles other than mechanically propelled ones, are in the State List. The State Government; have also the right to levy taxes on road transport, such as octroi and entry tax, taxes on goods and passengers carried by road, taxes on vehicles, and tolls.

11.5.2 Motor transport was first regulated under the Indian Motor Vehicles Act 1914 which had limited functions. With growth of motor transport, the need for regulating it to ensure safety and convenience of the public and development of a co-ordinated system of transport was realised. This led to the passing of the Motor Vehicles Act 1939 by the Government of India. This Act, with the amendments made from time to time, continues to be the main instrument through which motor transport is regulated in the country. The Act is enforced by State Governments which, with the concurrence of the Government of India can introduce amendments to its provisions, keeping in view local needs and circumstances. Almost every State has introduced special provisions in the Act. As a result, procedures and practices followed in States for control and regulation of road transport vary in detail. The Act provides for control of motor transport through a permit system, which is administered by State and the regional transport authorities. It also prescribes procedures for control and regulation of commercial vehicles, licensing of drivers and conductors, control of traffic by specifying traffic regulations, speed limits, carrying capacity of vehicles, and offences and penalities thereof. Since 1950 five amendments were made in the Act in 1956, 1969, 1976, 1977 and 1978. The main objectives of these amendments were to increase the period of regular permits from three to five years ; constitution of an inter-State transport commission, introduction of an inter-State permit system on the basis of counter-signatures of reciprocating States ; insertion of Chapter IV-A to facilitate operation of State Road Transport Undertakings ; provision of rules to facilitate fixing of fares and rates by the RTAs ; introduction of a national permit scheme in 1975 ; **provision of**

stringent punishment to curb drunkennees among drivers and compulsory wearing of crash helmets by motor cyclists ; minimum educational qualifications for drivers, and reservations for scheduled castes, scheduled tribes and other backward classes in regard to grant of permits.

Need to Replace Motor Vehicles Act

11.5.3 The main purpose of the original 1939 Act was to regulate motor transport primarily to avoid competition with the railways. With the phenomenal growth in road and road transport system since 1951, the restrictive character of this legislation has lost its relevauce. The Act as such cannot possibly meet positive requirements of facilitating road transport, particularly inter-State movement of goods and passengers. Secondly, piecemeal amendments made in the Act from time to time have rendered it cumbersome and complicated. We gather that Ministry of Shipping and Transport has received a number of suggestions for revising the Act from various quarters like the Transport Development council, the Standing Committee on Road Transport, State Governments, organisations and individuals interested in road transport. After making a preliminary scrutiny the Ministry formulated in June 1979 a comprehensive proposal for further amendment of the Act which is given in annexure 11.2 The proposed amendments mainly seek to simplify the procedure for granting permits and removing anomalies, providing stringent punishment for violation of driving regulations, and formulating uniform rules and regulations on height, length, width, laden weight, and seating capacity of motor vehicles applicable throughout the country. We feel that there is urgent need to overhaul the Act and replace it by a positive and coherent piece of legislation, which should help promote an efficient, economic and safe road transport system capable of meeting the growing demand on it.

11.6 Permit System

11.6.1 It is an offence to use any commercial motor vehicle in a public place in India unless it is covered by a permit granted or countersigned under the provisions of the Motor Vehicles Act by a Regional or State Transport Authority or the Inter-State Transport Commission. The permit specifies the route or area of operation and also the manner in which the vehicle is to be used, that is, as a stage or contract carriage, private or public carrier. Permits for stage carriages (passengers) are generally issued for specific routes and those for private and public (goods) carriers for specific regions. The permit specifies the type of vehicle to be used, its carrying capacity, fare and freight rates to be charged, and nature of goods that cannot be carried. In stage or passenger carriage, the time schedule for trips or services and standards of comfort and cleanliness to be maintained in vehicles are also laid down.

Operation of the System—Transport Authorities

11.6.2 The competent authorities to grant or countersign permits in accordance with provisions of the Motor Vehicles Act are the Regional Transport Authority (RTA), State Transport Authority (STA) and the Inter-State Transport Commission (ISTC). Each State has one STA and as many RTAS as the number of regions into which it is divided under the Act. The area of a region is usually co-extensive with a revenue district, a revenue division, or a presidency town, but this varies in each State. RTA is the primary authority for granting or countersiging permits for its region. STA's functions are to co-ordinate and regulate activities and policies of RTAs, settle disputes between them, and perform the duties of an RTA where no such authority exists, as is the case in some UnionTerritories, or when it is so requested by an RTA for any routes common to different regions. STA and RTA are constituted under Section 44 of the Act and consist of a chairman (having considerable judicial experience) and not less than two members. In most States, the post of the chairman, STA is generally held by either the transport commissioner, deputy transport commissioner, or member, board of revenue, as in Bihar. The post of chairman, RTA, is mostly held by the district magistrate or divisional commissioner depending upon whether the area of operation of the region is a district or a revenue division.

11.6.3 While the Act prescribes the minimum strength for STA/RTA the maximum strength is not specified. We gather that, in the absence of any maximum limit, some State Governments have appointed a large number of members to these authorities so that it is difficult for the latter to take quick and judicious decisions. The Act must prescribe both the maximum and

minimum strength for each of the transport authority. The maximum strength for each, in our view, should not be more than seven, including the chairman. Further, excluding the official and non-official members, the latter to include professional transport planners and one or two persons connected with transport industry.

11.6.4 It has been represented to us that discretionary powers presently exercised by STA to disqualify anyone from holding a driving licence. refusal to register defective vehicles, suspend or cancel registration of dangerous vehicles, suspend or cancel permits obtained through fraud or for misuse and to do so as a preventive action during the pendency of a court case are being abused and, therefore, these should be curtailed. We feel it will not be in the larger interests of regulation of road transport to do so, particularly when we have suggested broad-basing of STA and RTA who could be relied upon to exercise such powers judiciously. Regarding powers of the STA vis-a-vis the State Road Transport Undertakings, we are of the view that, unlike private operators, public sector undertakings must be relied upon to take into account public interest and determine the need for transport services in a particular area or route. There is thus hardly any need for STA to exercise control on public undertakings, as is being done at present. We, therefore, recommend that Chapter IV-A of the Motor Vehicles Act, which deals with these undertakings, should be suitably amended. Further, we also suggest, in the interests of efficient working of STA-RTA, that their chairmen who are senior State Government officials, should be delegated appropriate powers to cancel permits or compound offences relating to violation of permit regulations, subject to ratification by concerned STA-RTA. The proposed amendment of Section 60 of the Act in this regard would be a step in the right direction.

Appellate Tribunal

11.6.5 An appellate tribunal is set up by State Governments under Section 64 (2) of the Motor Vehicles Act to hear appeal and revision cases against decisions of STA or RTA regarding grant, transfer, suspension or cancellation of permits. The tribunal consists of a wholetime judicial officer not below the rank of a district judge. We learn that this provision has created an anomalous situation in some States. For example, in Bihar RTA, whose area is co-extensive with a revenue division, is presided over by the divisional commissioner who is of a higher rank than that of the district judge. It would be odious if an appeal against the decision of an RTA, headed by a divisional commissioner, is heard by the appellate tribunal, headed by a district judge. To remove the anomaly, we suggest that the Act be amended to provide that a person with "judicial or quasi-judicial experience" (in place of judicial officer not below the rank of a district judge) be appointed as the appellate tribunal. This will facilitate appointment of a senior official, namely, Member, Board of Revenue as the appellate tribunal to hear appeals against decisions of an RTA headed by a divisional commissioner. Further, the main objective should be to ensure that most appeal cases against grant or cancellation of permits are disposed of at the tribunal and protracted litigation beyond that level is minimised. For this purpose it would be desirable that, depending upon work-load, the State Governments may constitute more than one appellate tribunal to dispose of appeal cases expeditiously. This would involve amendment of Section 64 (2) of the Act to provide for appointment of more than one appellate tribunal.

Inter-State Transport Commission (ISTC)

11.6.6 The Inter-State Transport Commission was set up in 1958 under Section 63-A of the Act for developing, co-ordinating and regulating operation of trasnport vehicles on inter-State routes. The Commission comprises a chairman and two members. The functions assigned to ISTC include division of traffic on inter-State routes among conecrned States, specifying conditions attached to an inter-State permit, fixing maximum and minimum fares for passenger traffic and freight rates for goods traffic, and assisting in conclusion of reciprocal agreements between States, the objective being to facilitate smooth and efficient inter-State road traffic. The Committee on Transport Policy and Co-ordination recommended that the State Governments should delegate powers vested in them under Section 43 of the Act regarding granting, revoking, suspending and countersigning of inter-State permits to ISTC to enable the latter to play its assigned role. The question was also

considered by the Transport Development Council but the proposal to delegate the requisite powers to ISTC was, by and large, not acceptable to State Governments. In the circumstances, ISTC functions have been limited to facilitating reciprocal agreements between States regarding the number of Inter-State permits for public carriers under various schemes. We are of the view that since most functions envisaged for ISTC arise out of State Government's authority relating to grant of permits and other matters, which the latter would not delegate to the former, there is hardly any justification for ISTC to continue merely for promoting reciprocal agreements. We feel that such agreements could either be entered into by concerned State Governments directly or under the auspices of the Union Ministry of Shipping and Transport.

Intra-State Permits

11.6.7 Regular intra-State permits for stage and contract carriages and public or private carriers are generally issued for a fixed period of three to five years. The procedure for grant of private carrier permits is relatively simpler than for stage carriage and public carrier permits. The prescribed fee for private carrier permits is marginally lower than for public carriers. Private carriers are expected to be used for carriage of goods which are either the property of or are necessary for business of owner of the vehicle, not for hire or monetary reward. But we gather that that private carriers are sometimes used for commercial transport purposes. We do not see any justification for charging a lower fee for private carriers.

Public (Goods) Carrier Permits

11.6.8 The procedure for grant of both public carrier and stage carriage (bus) permits is prescribed in Section 57 of the Motor Vehicles Act, which requires RTA to invite applications, publish them in Government gazette and invite objections against them, which are also published in the gazette. Thereafter, a date is fixed for disposal of the case after a public hearing. The whole process is time-consuming. However, we understand that most of the State Governments have done away with this cumbersome procedure for goods carriers by making suitable amendments to their respective motor vehicle rules. Thus, the procedure for issue of intra-State public carrier permits has by and large been liberalised, but not for inter-State permits.* Further, we understand that the question of abolishing the intra-State permit system for public carriers is under examination of the Ministry of Shipping and Transport. We fully support the move in the interests of smooth goods movement.

Passenger Bus Permits

11.6.9 Of the two types of bus permits, namely, contract and stage carriage permits, the procedure followed for the former is relatively simple. But for stage carriage permits, a lengthy and cumbersome procedure, as described in the preceding paragraph, is required to be followed. While the State Governments have done away with the lengthy procedure for goods carriers, this is not so for stage carriage (bus) permits. Consequently, the grant of these permits takes an unduly long time. Meanwhile, in the absence of passenger service, the public is put to considerable hardship. We are of the view that while abolition of intra-State permit system for passenger transport may not be feasible, the procedure for grant and renewal of such permits should be streamlined so that the entire process does not take more than three to four weeks. First, the system of public hearings is uncalled for, as it leads to protracted litigation and delay in issue of permits, besides causing harassment to operators. This procedure can easily be replaced by RTA-STA inviting written objections from concerned parties within a specified period and taking them into account in granting or renewing a permit. Secondly, it also appears unnecessary to us to publish the application for a permit in the gazette, much less the representations received against it. In any case, issue of gazette notification must be confined to one stage, namely, that of inviting applications, not for any subsequent stages. Perhaps a notice published in newspapers alone would suffice. As each applicant furnishes supportive data, it should be possible for the transport authority to select a suitable candidate for the permit, keeping in view the objections received and without resorting to public hearing. Finally,

* The inter-State permit system is dealt with on pages *191 to 193*.

the present procedure of entertatining applications for stage carriage permits at any time should be replaced by inviting applications within a specified time schedule because, under the existlng procedure applicants with infiuence reportedly corner the permits.

Inter-State Permits

Public (Goods) Carriers

11.6.10 Public carrier permits issued for inter-State operations fall under two broad categories, namely, (i) permits issued under the procedure of countersignatures, and (ii) those issued under reciprocal agreements, including a "free-zone" agreement recently concluded by some northern States, as well as zonal and national permit schemes. For the first category, Section 63 of the Motor Vehicles Act requires inter alia that an inter-State permit to be valid must be countersigned by STA-RTA of the States other than the home State. Secondly, it is obligatory that either both the starting and terminal points of a route under such permits should be situated within the home State, or if the terminal point or part of such route lies in any other State the distance should not exceed 16 kms. In general the inter-State permit holders, including those with zonal and national permits, cannot pick up or off-load goods in States in transit, that is, in other than the home State, though such conditions are in their nature difficult to enforce. The procedure followed for grant and renewal of inter-State goods carrier permits under the contersignature mechanism is even more cumbersome. In addition to publishing applications and objections thereto in official gazette and public hearing in the home State, this procedure is repeated for securing countersignatures in the other State (s). Clearly, this is a time-consuming process, besides attracting a larger number of applications for temporary permits. Our suggestions to simplify the procedure made earlier apply equally to inter-State permits. There should, however be no restriction on the number of such permits, provided they are issued on payment of all taxes in the home State plus countersignature fee and goods tax in the other States.

Reciprocal Agreements

11.6.11 The procedure of countersignatures is not followed for inter-State permits granted as a result of reciprocal agreements between States. But every proposal relating to the number of such permits to be granted or countersigned in respect of each route or area has to be published by each of the concerned State Governments in an official gazette, specifying one month's notice within which representations on it are invited. The authority to receive such proposals and objections and the time and place at which these are to be considered are also notified. Thus, the number of public carrier permits issued under reciprocal agreements is controlled. and such agreements are facilitated by the ISTC. The whole procedure, including the determination of the number of inter-State permits to be issued is, again, a time-consuming process. Recently the northern States of Jammu & Kashmir, Punjab, Haryana and the Union Territoiy of Delhi agreed to from a "free zone" for unhindered movement of trucks within their territories on full payment of taxes due to other States at a single point.

11.6.12 Zonal and national permit schemes represent an extension of the inter-State permit system for public carriers under reciprocal agreements between the States, the objective being to facilitate free movement of goods by road within each zone, as well as inter-zonal movement on payment of taxes at a single point. However, for theses permits an annual composite fee of Rs. 700 per State (other than the home State, where full taxes have to be paid) is charged in lieu of the countersignature fee and goods for other States, which are levied for other inter-State public carrier permits. The two main attractions of these schemes to operators are the composite fee which is lower than full taxtion for other inter-State permits and single point taxation. Five agreements covering northern, southern, eastern, western and central zones have been concluded which specify the number of permits to be issued by each State. These agreements are periodically reviewed, modified and extended according to demand.

National Permit Scheme

11.6.13 The national permit scheme, introduced in 1975 as an extension of the zonal permit scheme, aims at facilitating smooth interregional movement of goods by road over five or more States. The total number of national permits is fixed by the Union Government. Initially, 5,300 national permits were sanctioned by the Ministry

of Shipping and Transport and allotted to State Governments on an ad hoc basis, keeping in view the number of trucks registered and requirements of individual States. The number of such permits sanctioned at present is 8,300. In response to pressing demands, the Ministry of Shipping and Transport proposed early in 1979 to increase the number of such permits by 2000.

11.6.14 Arguments have been advanced for and against expansion of the scheme. Truck operators and several State Governments on the one hand have sought a steady increase in the number of national permits for free flow of inter-State and inter-regional freight traffic. It has been argued on the other hand that this will adversely affect revenues of the State Governments other than of the home State, as well as rail earnings, and, therefore, the number of such permits should be frozen at the present level. We are, however, unable to understand how the 8,000 and-odd national permits could jeopardise rail traffic when most of them merely represent conversion of existing zonal permits into national permits.

11.6.15 Taking into consideration all factors, we fully support both national and zonal permit schemes, as they facilitate smooth inter-State and inter-regional freight traffic by road on the basis of single point taxation and without following the lengthy procedures of agreements, gazette notifications and countersignatures We are also not in favour of freezing the number of national or zonal permits at the current level. On the contrary, we favour an increase in the number of these permits provided, as already observed earlier,* all the taxes applicable to each participating State are paid and collected at a single point in the home State. In our view the future of these schemes need not be linked with arguments of competition between rail and road transport but considered objectively on the basis of resource-cost analysis. We have already mentioned that long-distance freight traffic in future should move by and large by rail.** However, keeping in view the constraint of railway capacity, break of gauge problem, and movement in any case of certain specialised high-value freight traffic by road, zonal and national permit scheme will be significant for long-distance goods movement.

11.6.16 We would emphasise that inter-State and interzonal movement of goods by road should be made as free of restrictions as possible through simplification of procedures governing issue of permits, levy of single point taxation, reduction in tax disparity between States and enlargement of "free zone" agreements. Other hinderances must also be removed. For instance, there is at present no uniformity in regard to limits of height, length, seating and carrying capacity of motor vehicles in the motor vehicle rules of States, as requisite powers (Section 70 of the Motor Vehicles Act) vest in State Governments. We understand that there is a proposal to vest such powers in the Central Government which, in our view, is essential, as this would bring about uniformity and promote efficiency in inter-State goods imovement.

11.6.17 *Passenger Services* : Regarding inter-State passenger services, we hold the view that State Road Transport Corporations should be authorised to enter into reciprocal agreements with their counterparts on the number of buses, routes, fares, and timings on behalf of State Governments, without having to follow the long procedure of publishing proposals in the official gazette, inviting objections, public hearings, and so on. Indeed, State Corporations could be relied upon to safeguard public interest while entering into reciprocal agreements on behalf of State Governments for inter-State passenger services. For private sector buses, reciprocal arrangements between states should also be co-ordinated with those of public sector services on the basis of single point taxation and adequacy of services ensured.

Temporary Permits :

11.6.18 Section 62 of the Motor Vehicles Act provides for issue of temporary permits both for goods and passenger traffic for not more than four months. Temporary permits can be issued for intra-State as well as inter-State movements. By definition, these premits are expected to meet specific temporary requirements, such as, conveyance of passengers on special occasions and for carrying of seasonal business. In addition, the Act provides for issue of a temporary premit for any route or area pending court decision on

* See Chapter 4. ** Refer Chapter 3.

an application for renewal of an existing regular permit, but this cannot be granted for any route or area specified in an application for a new or regular permit. The fee charged for a temporary permit is higher than for a regular permit. We gather that a relatively larger number of temporary permits, compared to regular ones, are being issued and frequently renewed, even though the law restricts their renewal, mainly because the procedure followed here is simple, as there is no need to publish applications in official gazette, invite objections and hold public hearing. This is particulary so in regard to inter-State permits as the procedure adopted in issuing such permits is very time-consuming. As a result, temporary permits in a number of cases have practically become regular permits.

11.6.19 Representations have been made to us that the present practice of issuing a large number of temporary permits and their indefinite renewal has caused a serious distortion in the permit system. It has also led to malpractices, as these premits can be granted at the discretion of STA or RTA. Often temporary permits are allegedly issued to operators with little competence or capacity, resulting in low quality of transport services. Further, the practice of issue and frequent renewal of temporary permits for routes having passenger traffic potential deprives applicants for regular permits and stands in the way of continuity of services.

11.6.20 In our view the system of issue and renewal of temporary permits needs to be revised, in addition to streamlining of the procedure for issue of regular permits. The main problem arises because the Motor Vehicles Act does not distinguish between a temporary permit required for a short-term need and the one for operating a service in an area or on a route, which initially may not have enough traffic intensity to warrant issue of a regular permit but may have traffic potential in the long run We, therefore, recommend that the Act should have a provision under which a distinction can be made between a purely short-term need for a specific purpose, and for issue of a temporary permit for a route or area having traffic potential, which can eventually be converted into a regular permit. In granting the latter, it will be in the interest of continuity of transport services if preference is given on the basis of "first come first served" to operators who are interested in regular permits. Further, we would stress that temporary permits issued for short-term requirements need not be renewed. When temporary permits are issued as a stop-gap arrangement for areas or routes, which have traffic potential, these must not be renewed indefinately but converted into regular permits as soon as traffic builds up.

11.7 Finance for Road Transport

11.7.1 As road transport industry is largely in the private sector, it depends on finance from private sources in addition to bank finance. Funds are required by the industry not only for capital requirements of purchase of vehicles, land and building, construction of bus terminals and godowns, but also for working capital as well as repayment of loans. Thus, availability of adequate finance at reasonable terms is of crucial importance in road transport development, whether it is in the public or private sector or is for freight or passenger transport. The Committee on Transport Policy and Co-ordination (1966) and the Study Group on Road Transport Finance (1968) recommended expansion of commercial bank credit to this industry, improvement of working of hire-purchase finance agencies in the private sector as well as financial performance of public sector passenger transport undertakings. As a result of action taken on their recommendations, flow of funds to the industry has improved considerably. We have not come across any evidence that growth of industry has been constrained for want of finance. This is also clear from the steady growth in the number of commercial vehicles in the country.

Goods Transport

11.7.2 Trucking industry is predominantly in unorganised private sector and bulk of truck operators are single truck owners. They depend primarily on goods booking agencies for operation. The problem of finance is critical in their day-to-day business. For finance, they largely depend on private sources such as hire-purchase finance agencies besides commerical banks and, in some cases, on goods booking agencies as well. Presently, banks charge commercial rates of interest on loans advanced by them. Interest rates charged by hire-purchase financiers aud private parties are

higher than for bank loans.

11.7.3 Following Government decision to treat road transport industry as a scheduled industry eligible for bank finance, commercial banks have adopted a positive approach in this regard. Direct loans given by banks to such transport operators whose investment is less than Rs. 7.5 lakhs are treated as advances to small scale industries, for which targets are fixed. The Reserve Bank of India is also considering inclusion of transport operators with account limits of Rs. 2 lakhs or less under priority sector, eligible for bank finance and those with account limits of Rs. 1.5 lakhs or less but guaranteed by the Deposit Insurance and Credit Guarantee Corporation as priority sector, that is, for weaker sections. We learn that bank and hire purchase agencies have also been encouraged to advance credit to this sector through a suitable entry in registration certificates of vehicles to the effect that the concerned financier has an interest in the vehicle and that ownership cannot be changed without clearing the loan (as per Section 31-A of the Act). The State Finance Corporations also lend monies to road transport industry. The limit of accommodation provided is Rs. 30 lakhs for a company or a co-operative society and Rs. 15 lakhs for individuals and others. Further a comprehensive credit guarantee scheme, formulated by the Credit Guarantee Corporation of India, was introduced by the Reserve Bank of India in 1971 to provide guarantee cover in respect of small loans to transport operators. Individuals or associations of not more than six individuals are eligible for credit under this scheme for only one vehicle. The amount of loan advanced is not more than Rs. 50,000 which mainly facilitates purchase of auto-rickshaws or tempos.

11.7.4 Details of advances made by private sector agencies and all public financial institutions are not available. Information on the number of accounts of road transport operators, financed by commercial banks, and loans outstanding for each of the nine years ending June 1978, is shown in table 11.5.

Table 11.5

Loans to Road Transport Operators by Commercial Banks

Year ending	Number of Acounts	Amount of loan outstanding (Rs. crores)
1	2	3
June 1970	12,690	24.42
June 1971	23,276	39.85
June 1972	31,098	50.47
June 1973	43,953	62.80
June 1974	63,572	83.37
June 1975	73,446	113.37
June 1976	107,518	193.40
June 1977	130,415	252.58
June 1978	196,800	305.52

Source : Economic Surveys 1969-70 to 1978-79, Ministry of Finance.

Note :— The total loans would include advances to passenger transport operators also.

Evidently, availability of commercial bank credit to industry has increased steadily over the years, and so have amounts of outstanding loans.

11.7.5 Though increased bank finance to road transport industry is being released, we understand that this has not been uniformly spread throughout the country. Transport operators and user interests have complained that bank loans are available for purchase of new vehicles but not for second-hand ones. Secondly, repayment period is short, genegally three to five years. Thirdly, margin money to be provided by a transport operator himself is rather high, ranging from 25 per cent of the cost of vehicle for loans from commercial banks to 40 per cent from State Finance Corporations. The cumulative effect of all these conditions is that bank finance

benefits the relatively richer transport operators with larger fleet who are in a position to find margin money from their own sources. The small operator, who constitutes bulk of industry, has necessarily to depend on private financiers who charge exorbitant rates of interest. Banking industry, however. has pointed out that repayment of bank loans by operators is far from satisfactory and, in a number of cases, the Credit Guarantee Corporation had to pay up because of default of borrowers, and that this acts as a severe constraint to liberal bank advances to road transport industry.

11.7.6 We are ware that high cost of private finance adds to transport costs. We, therefore, feel that, to the extent feasible, working of private finance agencies should be regulated so that interest rates charged by them are not unduly high. As a first step, an attempt must be made to regulate business of organised goods booking-cum-financing agencies. In respect of finance from commercial banks and public financial institutions, we feel that certain improvements are immediately called for. First, margin money stipulation should be rationalised and slightly reduced. Secondly, repayment period of loans should be enhanced from the present limit of three-five years to five-seven years. Thirdly, appropriate credit facilities should be provided for purchase of second-hand vehicles. We think that softening of terms of bank finance will not only help the industry but also improve repayment of loans. Ultimately, however, a satisfactory solution to the probiem of road transport finance would lie in increasing flow of funds from banks and public financial institutions so that dependence of operators on private financiers is minimised. As a first step, we would suggest constitution of a separate cell in either the Reserve Bank of India or the Industrial Development Bank of India to evolve suitable guidelines and determine the overall quantum of credit required by road transport industry and to monitor and co-ordinate the work of all public financial institutions.

Passenger Transport

11.7.7 Passenger transport services are operated both by private and public sectors. For private bus operators, the problems of finance and conditions thereof are the same as for truck operators. Accordingly, the suggestions we have made earlier for improvement of facilities of institutional finance to truck operators equally apply to bus operators.

Public Sector Road Transport Undertakings

11.7.8 The main source of finance for nationalised road transport undertakings is Government development finance provided through State plan outlays. Plan outlays cover the entire requirements of the undertaking, if it is run departmentally. The undertakings set up under the Road Transport Corporations Act 1950, are, however, financed from out of loan capital contributions made by State Governments in addition to contribution of the Central Government which is half the amount made by the former. In addition, internal resources are also generated by some undertakings. A few undertakings resort to market borrowings as well. The extent of such borrowings depends on the overall ceiling for the State Government and is subject to State Government's sectoral priorities. Thus, credit from public financial institutions and commercial banks fill the gap in the context of constraint of plan outlays and insufficiency of internal resources. In addition, State Transport Undertakings avail of facilities under the bills rediscounting scheme of the Industrial Development Bank of India. Recently, the life Insurance Corporation of India too has taken a decision to grant long-term loans to these undertakings. All the same, some public sector undertakings have complained of inadequacy of capital resources for replacement of over-aged fleet, expansion of services and development of workshop facilities.

11.7.9 Certain suggestions have been made for improving the financial position of public sector road transport undertakings such as earmarking of a certain percentage of the total State plan outlay for the undertakings, and allowing them to raise bonds in capital market. Plan allocations, generation of internal resources and market borrowings are inter-related. There is no doubt that inadequate plan allocations (compaıed to growing needs of traffic) coupled with inflexible fares policy in the wake of rising costs is a major constrain to replacement of over-aged fleet and expansion of services by these undertakings. By and large, fares charged by the undertakings do not cover short-term marginal costs, as these are kept low as a deliberate policy of the Government. A major

bottleneck to generation of adequate internal resources is. therefore, the inability of public sector undertakings to charge economic fares. The result is that market borrowings at higher interest-rates are sometimes resorted to, which further add to costs. We are of the definite view that, ultimately, the only effective way of improving their financial position is to allow them to raise fares to economic levels, thereby facilitating generation of internal resources, which, as a policy, should be a potent means of meeting their financial requirements and should, therefore, receive priority. The Seventh Finance Commission too has stressed this point. The Commission observed that these undertakings should realise a minimum return of 6.5 per cent on capital investment.

11.7.10 We are informed that another factor which adds to operational costs of these undertakings and inhibits generation of internal resources is the manner in which State Governments make capital contributions under the Road Transport Corporations Act. Presently this is in the form of loan capital contribution which adds to the burden of undertakings, since interest on the loan capital is payable even when the undertakings incur losses due to social obligations (to charge lower than economic fares) they are required to meet. It has also been argued that if contributions are made to the undertakings by way of equity capital, it would relieve them of the burden of interest and may even yield dividends to State Governments when these undertakings make profits. We feel that a mere change in the manner of capital contribution by itself would not improve the position unless undertakings are given appropriate freedom in fixation of fares. When they are asked to operate services on losing routes and to charge low fares as a social obligation, they must in our view be compensated by a direct exchequer subsidy.

Finance for Infra-structure Development —Truck Terminals

11.7.11 During our visits to States and discussions with representatives of road transport industry, we observed that road transport suffered from lack of adequate infra-structure facilities. The position was somewhat better for passenger buses which had workshop facilities and sheds wherever public sector undertakings where operating. But for trucking industry, which is mainly in private hands, the position is most unsatisfactory. Little space is earmarked in urban centres for vehicle repair, parking during idle hours, overnight stay, and for loading and unloading of cargo. There are also problems of accommodation for goods booking agencies in big cities, provision of rest places for drivers and transport workers, inadequacy of workshop facilities and weigh bridges. If these facilities could be brought together, it would help both user and supplier of transport services by localising services at a terminal point. We recommend that to start with, truck terminals-cum-rest places-cum-service centres should be built in each big city having a population of ten lakhs or more, for which space should be earmarked in master plans of such cities. In the interests of safety, fuel economy and avoidance of congestion. construction of truck terminals should, in our view, be treated on the same footing as passenger and wayside amenities. Since road transport is a State subject and revenue from commercial vehicle taxation goes to the States, we consider it appropriate that by and large such schemes should be financed by State Governments as a part of their five year plans. In view of overall financial constraint, it would be imperative to draw up master plans for the purpose for each State which should be implemented in a phased manner. We would however, add that the Union Government may consider providing appropriate fiscal incentives to private transport operators such as exemption from income tax to encourage them to make financial contributions towards construction of truck terminals. This could partly relieve the financial burden on State Governments in this regard.

11.8 Fare and Freight Policy

11.8.1 Fares and freights in road transport are regulated under Section 43 (1) (i) of the Motor Vehicles Act under which the State Governments can issue directives to the State Transport Authority regarding fixing of fares and freights for stage carriages, contract carriages and public carriers. Rates are regulated on considerations of reasonable profit to industry keeping in view the public interest. These are not determined on any objective basis of cost and profitability studies of transport establishments. Maximum, minimum and, in some States, specific fare or freight rates are fixed, having regard to physical terrain, road surface and volume of traffic in various regions. But there is no uniform basis on which rates are fixed in actual practice in different States and, in

some cases, between regions within a State. The State Governments also do not have any separate agency for enforcing fare and freight rates. To the extent possible, these are enforced by Transport Authority by making it a condition of a permit that fares and freights beyond the prescribed levels would not be charged. Violation of this condition renders the permit liable for cancellation or suspension under Section 60 of the Act and the operator is liable to prosecution. In short, the main problem is of objective determination of structure of fares and freights and of their effective enforcement.

Freight Rate Policy

11.8.2 Though State Governments are empowered under the Act to fix both maximum and minimum freight rates, most of them have fixed only the maximum, not minimum, freight rates. In the absence of an appropriate enforcement machinery, freight rates in actual practice are determined by market forces of demand and supply of trucking services. Since the industry is predominated by single truck operators, goods booking agencies play a crucial role in this regard. For effective regulation of freight rates, Section 66-A was incorporated in 1969 under Chapter IV of the Motor Vehicles Act providing for licensing of goods booking agencies. A few States framed rules in this regard but the progress was slow on account of writ petitions challenging this Section. However, this hurdle has since been removed by placing, inter alia, the Section in the Ninth Schedule to the Constitution, thereby placing it outside the purview of law courts.

Goods Booking Agencies

11.8.3 Goods booking agencies are engaged in collecting, forwarding and distributing goods carried by public carriers. In addition, some of them provide finance to operators. There are three main types of their operations. First, there is an agreement between a booking agent and a transporter for a stipulated period during which the former arranges guaranteed freight at rates fixed in advance. Secondly, booking agents have day-to-day arrangements and offer goods to operators at prevailing market rates. Thirdly, the booking agent acts as an intermediary between consignor and transport operator, charging commission from both. We understand that regulation of goods booking agencies was recently examined in the Ministry of Shipping and Transport with particular reference to the third category mentioned above who act as middlemen. It was felt that State Goverments should examine cost of operations and the extent of turnover of booking agencies after a random sample study of their audited books of accounts. For this purpose it would be necessary to make it obligatory in licensing rules for booking agencies to produce their books of accounts. After obtaining an idea of their profitability, the State Governments may fix maximum rate of commission for these agencies as a percentage of freight in different slabs with rates varying inversely with the increase of slabs. The highest rate for any slab should not exceed 10 per cent.

11.8.4 We have received representations that goods booking agencies have been exploiting small operators by retaining high margins of commission on freight and charging exorbitant interest rates wherever they act as financiers as well. However, we have not come across any concrete evidence to show that booking agencies exploit operators as they seem to be operating in a competitive market. Now that there are no more legal hurdles to their licensing, we would stress that all State Governments should first license them. We would also recommend that a thorough study be made before rates of commission are prescribed for enforcement. Further, if rates of their margin are to be linked with freight rates (which, in turn, differ from State to State), it is essential that the principles governing the latter are appropriately formulated to avoid wide disparities as between States. We consider that this is a fit subject for the proposed national transport commission to study.

Passenger Fares

11.8.5 The position of fixation and enforcement of passenger fares is comparatively better than of freight rates. Bus fares are expected to be fixed by State Governments in consultation with the STAs and the State transport undertakings, after taking into account the cost of operations and a reasonable margin of profit for the operator. In actual practice, however, this procedure is not followed, mainly because no appropriate

methodology fer determining cost of inputs has been laid down in most States. Secondly, there is no inbuilt systemto provide for an increase in fares commensurate with increase in cost of inputs, individually or cumulatively. Some State Governments occasionally review and study fare structure taking into account a number of factors, such as the terrain, condition of roads, type of vehicles used and incidence of local taxes on inputs. But a comprehensive exercise into operating costs and profit margins of bus companies is seldom attempted in order to determine the fares. Normally, graduated farcs directly proportional to distance travelled are prescribed in respect of inter-city or inter-district services, while telescopic fares are often fixed for intra-city services, that is, a fare structure under which short-hoppers pay at a higher rate and those travelling over longer distances at a lower rate.

11.8.6 Regarding the policy for fixation of fares, we deem it necessary that they should be so fixed as to fully cover short-run marginal costs.* This implies that fare structure should be made flexible to accommodate genuine increase in operational costs but which are not the result of inefficient operation. Further, while we fully support fare structure which is progressively proportional to the distance travelled as for inter-city and inter-district services, we are not convinced of the rationale of telescopic fares for intra-city services. We would suggest that each city transport authority may examine the implications of this system keeping in view the need to disperse business activity away from the busy city centres, reduce influx of people and also uneven pressures on transport system. Secondly, we consider that appropriate sample studies should be undertaken periodically to collect data on operational costs and profitability of bus operators, and thereafter fare structure should be fixed for different regions and types of services. These studies should be undertaken by competent agencies independent of STAs as well as State transport corporations. It would be profitable to associate transport economists, chartered accountants and traffic planners with such studies. As half of passenger transport is in the public sector, relevant aspects of fare policy for public sector undertakings would be dealt with in the following pages.

11.9 Public Sector Road Transport

11.9.1 Since the inclusion of road transport industry in the list of industries to be progressively nationalised under the Industrial Policy Resolution of 1956, considerable progress has been made especially in passenger transport. The main objective of State participation in road transport has been to provide efficient, adequate and economically run passenger services and, in goods transport, to meet particularly the needs of hilly and under-developed areas where private operators would not be forthcoming. As noted earlier,** public sector currently accounts for about 50 per cent of passenger transport and less than one per cent of goods transport in terms of ownership of commercial vehicles.

Goods Transport

11.9.2 Until the beginning of Third Plan, the policy was not to expand nationalisation in freight transport. In 1962 the Central Road Transport Corporation (CRTC) was set up by the Union Government to serve as a model goods transport company. The Committee on Transport Policy and Co-ordination (1966) also stressed on public sector participation in goods transport as an instrument for strengthening the road transport industry as a whole, set standards of performance, achieve co-ordination between different agencies of transport and meet the needs in hilly and isolated areas. Various State Governments especially of the north-eastern region, started goods transport services along with passenger services. However, the experience gained in this regard has not been encouraging. Following the recommendations of the Parliamentary Committee on Public Undertakings which fonnd the CRTC as an uneconomic proposition, it was closed down in February 1977. Presently, goods transport services are being run in public sector along with passenger services in a few States, namely, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Orissa, Sikkim, Tripura, Uttar Pradesh and West Bengal. However, these servises cater to a small proportion of total goods traffic and their operations are not economically viable.

* See Chapter 4 ** Vide para 11.4.1.

11.9.3 We have received representations that share of public sector in goods transport should be increased with a view to breaking the monopoly of private sector as also to ensure better co-ordination between road and rail services in goods transport. We have considered all aspects of the matter, including the experience gained so far. First, wherever goods services have been operating in the public sector, they have been incurring losses and thereby adding to the financial burden of the State Governments. Secondly, since those limited services have by and large not performed well, they have not set any high standards. Thirdly, co-ordination with other modes of transport cannot be achieved by a mere change in ownership pattern. Fourthly, the argument that private sector exploits its monopoly position in goods transport does not hold much water since the industry. predominated as it is by single or two truck operators, seems to be functioning in a competitive market and has by and large responded to public demand. Finally, the financial requirements for a complete take-over of goods transport by Government, would be very large. Keeping all these in view, it is our considered opinion that nationalisation of goods transport would not be worthwhile. We would, however, recommend that State Governments may consider denationalising limited uneconomic goods services presently operated in some States in case it is found that private operators could deliver the goods without any dislocation to traffic.

Passenger Transport

11.9.4 Growth of passenger road services in public sector since 1960-61 in terms of number of undertakings, capital invested, fleet strength, traffic handled and persons employed is indicated in table 11.5.

In 1960-61, the number of public sector undertakings was 28 ; they owned about 18,000 buses (accounting for 32 per cent of buses in the country), handled about 26 b. PKm of passenger traffic and employed 1.4 lakh people. By 1977-78, while their number increased to 48, they owned over 58,000 buses, which constituted about 50 per-cent of total bus population. Traffic handled and employment provided by them in 1977-78 was substantial, namely, an estimated 140 b. PKm and and 4.2 lakh persons respectively. Capital investment in these undertakings in 1977-78 at an estimated Rs. 735 crores, was nearly two-and-a-half times higher than in 1970-71.

Table 11.5

Growth of Public Sector in Passenger Transport

S. No.	Indicators	1960-61	1970-71	1977-78
1	2	3	4	5
1.	No. of undertakings	28	32	48**
2.	Capital employed (Rs. crores)	NA	296	735*
3.	**Fleet Strength**			
	(a) No. of buses owned	17,962	37,073	58,128
	(b) Percentage of total buses in the country	31.6%	39.5%	49.5%
4.	Passenger traffic handled (Billion PKM)	26.2	80.7	139.5*
5.	Total employment (000 Nos.)	141	277	421

Source : Ministry of Shipping & Transport (DTR) and Association of State Transport Undertakings.

** Includes two exclusively goods transport undertakings. * Estimated.

11.9.5 The persent nationalised undertaking, fall under the following broad categories :

	Category	Number
(i)	Undertakings constituted under the Road Transport Corporation Act 1950.	21
(ii)	Transport services run by municicipal authorities	7
(iii)	Undertakings registered under the Companies Act 1956	12
(iv)	Services run by Government departments	8
	Total	48

While there is total nationalisation of passenger transport in Maharashtra, Gujarat, Haryana and Sikkim, the quantum of nationalisation in other States varies, depending upon advantages and disadvantages of nationalisation considered by State Governments, adequacy or otherwise of private sector services, and experience gained in operation of nationalised services.

Performance

11.9.6 During our visits to States, we gathered that by and large public sector passenger undertakings have been providing satisfactory services with regularity of bus schedules and lesser malpractices in fares charged and collected, as compared to private operaters. However, there have been complaints that passenger services run by public sector are inadequate, and suffer from frequent break-downs and discourteous behaviour of staff. It is also argued that they are not run efficiently and economically which is reflected in operational losses incurred by many of them. In other words, their performance is often judged on the basis of financial profitability.

11.9.7 We have given some thought to the matter. Even though there is a direct relationship between operational efficiency of an undertaking and its financial results, there could be circumstances and conditions where even a well-managed and operationally efficient undertaking may have to incur losses. Sometimes, uneconomic fares fixed as a deliberate policy of Government on social rather than commercial considerations is responsible for such losses. It would, therefore, be appropriate to examine operational efficiency in terms of cost per unit of output (PKm) rather than on financial results.

11.9.8 From among a set of performance indicato rs (size of fleet, percentage of over-aged buses, fleet utilisation, vehicle utilisation and occupancy ratio) and other factors, such as ratio of surfaced to total road length, density of buses per lakh of population and nature of services (intra-city, inter-district or in hilly areas), we have tried to identify paramcters which may influence per PKm cost. Relevant cross-section data on such parmeters have been computed for 1976-77 for 31 undertakings and related to cost net of taxes since tax element has no bearing on efficiency of performance. Main components of operational costs (not of taxes) are fuel, personnel and material costs, depreciation and interest charges. Personnel cost on an average accounts for 32 per cent of total cost, followed by material and fuel costs (22 per cent each), depreciation (11 per cent) and interest charges (8 per cent). These data show that there is least variation in fuel cost per PKm between different undertakings. Personnel and material costs, which together account for 55 per cent of the total, have a relatively higher variation, thereby showing tne scope of improvement through management effort.

11.9.9 Further, we find that for 17 out of 18 combined (intra-district, inter-district and city) non-hilly services, revenue earned per PKM covers cost net of taxes. Revenue realised by twelve of these undertakings covers even the total cost. However, five out of the seven predominantly hill State services do not cover cost net of taxes while three of the six exclusively city services cover. Thus, out of 31 undertakings examined, 22 were able to cover cost net of taxes in 1976-77.

11.9.10 Regression analysis has been made to identify significant variables (both within and outside the control of mangement) which influence operational costs. Results of such analysis, together with the cross-section data referred to earlier, are given in annexure 11.3. The analysis

shows that vehicle and fleet utilisation are the most significant factors that affect operational costs, particularly in respect of personol, fuel and material costs. In addition, ratio of surfaced to total roads and the nature of operations also influence costs. Since the latter are beyond the control of management, the thrust of policy has to be to maximise fleet and vehicle utilisation.

11.9.11 Though the level of performance varies in different undertakings, we find that a number of them barring hilly and some metropolitan undertakings, by and large, have been performing well. The scope for improving their profitability lies more in allowing them to charge economic fares about which we have stressed earlier. This is not to understate the constant need to minimise costs through efficient management. As mentioned earlier, charging of economic fares is essential to enable the undertakings not only to eliminate losses whieh are estimated to be Rs. 295 crores in the Sixth Plan, or cover short-term marginal costs, but also to generate sufficient internal resources for addition to the fleet and timely replacement of over-aged buses. There is also need to improve managerial efficiency through application of modern management techniques of route and schedule planning and material and personnel management. Development of professional transport planning and management cadres is also called for.

Policy on Nationalisation

11.9.12 Regarding policy on nationalisation, we are of the considered opinion that future nationalisation should be guided by efficiency of operations of existing undertakings, and the extent to which they can provide consumer satisfaction and find necessary resources through internal generation, institutional finance or Government contributions. This implies that "profit" and "service" motives need be balanced. The thrust of policy then will have to be to consolidate and improve existing operations before taking up new routes.

11.9.13 We would also emphasise that the future programme of nationalisation in each State should proceed according to a long-term plan drawn up for 5 to 10 years. Such an approach will remove uncertainty and enable private operators to provide services on routes not likely to be run by public sector. In the process of taking over new routes, least inconvenience should be caused to public. In this connection, it would be desirable to prescribe a time-limit, say, of one year during which if a state transport undertaking is not able to run a service already notified, the notification should automatically lapse so that the travelling public does not suffer. In respect of routes partially nationalised, that is, where both private and public sectors operate on the same routes, there is unhealthy competition between them to the detriment of traveliing public. We, therefore, feel that as far as possible total, not partial, nationalisation of the routes should be effected.

11.10 Fuel Economy in Road Transport

11.10.1 Road transport depends on scarce, non-renewable sources of energy, that is, petrol and high speed diesel (HSD), Petrol is almost exclusively consumed by mechanised road transport (cars, jeeps, taxis, two and three wheelers), while HSD is consumed by rail transport, agricultural pumps, tractors, inland water transport, and coastal bunkers, in addition to road transport, namely buses, trucks and most of light commercial vehicles. Recent trends in consumption of POL may be seen from data given in table 11.6.

Table 11.6

Trends in Consumption of POL

(In million tonnes)

Year	Total P. O. L.		H. S. D.		Motor Gasoline (Petrol)	
	Total consumption	Road transport	Total consumption	Road transport	Total consumption	Road transport
1	2	3	4	5	6	7
1974-75	23.023*	6.322* (27.46)	6.438	5.073 (78.80)	1.247	1.247
1975-76	23.673	6.432 (27.17)	6.595	5.154 (78.15)	1.275	1.275
1976-77	25.326	6.591 (25.74)	7.106	5.267 (74.12)	1.316	1.316
1977-78	26.939	6.811 (25.24)	7.739	5.415 (69.97)	1.388	1.388

Note : Figures in brackets are per cent consumption in road transport to total consumption in the country.
* : Relate to the calender year 1974.

In spite of rise in price of petroleum products, the total consumption of POL in the country has shown an increase, from 23 million tonnes in 1974-75 to 27 million tonnes in 1977-78, that is, by 17 per cent. Consumptiou by road transport has also grown over the same period but at a relatively slower rate of by about 8 per cent, The share of road transport in total consumption of POL has, however, shown a decline from 27.5 per cent in 1974-75 to 25.2 pcr cent in 1977-78. This is primarily on account of relatively slower growth of HSD consumption in road transport, The share of road transport in total HSD consumption has declined from 79 per cent in 1974-75 to 70 per cent in 1977-78. Nevertheless, in absolute terms, consumption of both HSD and petrol by road transport has shown an increasing trend. In the context of fuel crisis involving high foreign exchange costs and inadequate availability, the need for conservation of POL, particularly HSD, assumes significance. We are aware that as a result of intensification of development effort and dispersal of economic activity, there would be increased demand on transportation, including road transport. Hence, it would be unrealistic to expect thad HSD consumption in road transport would show a declining trend. In our view, the thrust of policy should be on economical use of fuel in road transport for which there seems to be considerable scope.

11.10.2. For effecting fuel economy in road transport, an all-round effort is called for. This should include improvement and proper maintenance of the road system since bad roads reportedly enhance fuel consumptson. Considerable reduction in the number of octroi checkposts, which lead to wastage of trucking time and to an extent of fuel, is another means of bringing about fuel economy. Further, substantial fuel saving possibilities exist through improvement in vehicle design, better driving skills, and proper vehicle operation and maintenance.

Vehicle Design

11.10.3 We understand that there is scope for improving fuel efficiency of motor vehicles by effecting changes in engine design such as change from pre-combustion to direct combustion engine, provision of engine exhaust brakes which can cut off HSD flow when it is driven by wheels while coming down the hill or slowing down of plains, and by designing of light-weight but strong body of vehicles made of aluminium or fibre glass to reduce dead weight of the vehicle. The chassis of vehicles could also be redesigned as an integrated unit to redistribute weight of the vehicle for better power development. Both automobile manufacturers as well as transport operators should explore such possibilities. The matter should receive urgent attention of Directorate General, Technical Development.

11.10.4 It has been argued on behalf of automobile industry that, in the interests of fuel economy and savings in transport cost, introduction of heavier payload vehicles and truck or tractor semi-trailer combinations has a distinct advantage over conventional trucks. We are of the view that for road safety system and need for fuel conservation, trailerisation should be preferred to single-deck higher pay-load vehicles. Accordingly, this may be encouraged, keeping in view the carrying capacity of road system,

Vehicle Operation and Maintenance

11.10.5 It is well known that timely and proper maintenance of vehicles and certain operational measures contribute to fuel savings. Better fuelling practices avoid spillage and leakage in vehicles. Periodic and proper check of fuel transmission equipment like feed pump, fuel filters, fuel injection pump, high pressure pipes, injectors and derating of fuel injection pumps to suit loads carried on specific routes could also effect savings. Other critical and useful maintenance jobs are tyre pressure and brake-pedal check, engine tuning and air cleaner maintenance. We consider that operational measures, such as timely replacement of over-aged vehicles, plying of relatively younger vehicles for long-distance traffic, rationalisation of operations through proper routing and scheduling and minimisation of dead kms of vehicles, particularly in passenger transport services, could lead to fuel savings. There it also scope for fuel economy through improved driving habits, for instance, avoiding jerky and fast racing starts, sudden acceleration and braking, frequent change of speed, overspeeding and bad clutch handling

11.10.6 We understand that the Association of State Road Transport Undertakings is pursuing the possibility of recycling used engine oil on a large scale, which is a worthwhile endeavour. However, it is reported that levy of excise duty on recycled oil is liable to make it uneconomical. In the absence of permanent exemption from excise duty on recycled engine oil, the possibility of large-scale adoption of this practice is doubtful. We recommend that recycled engine oil should be exempted from excise duty on a permanent basis with suitable safeguards against its misuse, so that public sector undertakings are enabled to set up recycling plants and use recycled engine oil widely.

Intermediate Puplic Transport (IPT)

11.10.7 Intermediate public transport modes (IPT), for instance, mini-buses, taxis, motor cycle and scooter rickshaws, cycle rickshaws, tempos and tongas, which are "in-between" private and conventional public transport, constitute an important segment of transport system in India. There main advantages are flexibility of routes, lesser travel time, door-to-door services and capacity to cater to urgent traffiic demand. We will discuss the role of mechanised IPT modes in passenger transport in urban areas in Chapter 12. We would like to emphasise here the added significance of non-mechanised IPT modes through provision of finance on soft terms, construction of sheds and liberalisation of their licensing. There is scope for carrying out improvements in cycle rickshaws, such as provision of hand-operated lever brakes for rear wheels, better tyres and better design. The technical and economic feasibility of fixing multi-speed hubs in cycle rickshaws to reduce strain on the driver also should be looked into. DGTD and bicycle manufacturers should examine these possibilities in detail. R&D effort is also called for to improve the design of handcarts and wheel barrows with a view to improving their capacity and reducing strain on the operator.

Taxis

11.10.8 Taxis, which numbered about 76,000 in 1977-78, serve as an important intermediate public transport for intracity travel and even for inter-city passenger movements, supplementing bus transport. They use petrol as fuel which is priced over two-and-a-half-times higher than diesel. As cost of travel by taxis is high, the general public cannot afford to use them, except in emergencies or on rare oceasions. Shared taxis of late have emerged as an important complementary mode on account of inadequacy of public bus transport in major cities. Shared taxis, however, are not in vogue on a large scale since the per head cost of travel (despite sharing by four or five passengers) is still high. This is mainly because of relatively high price of petrol compared to diesel.

11.10.9 It has been represented to us that if taxis are dieselised, that is, their engines are allowed to be converted from petrol to diesel it eould result in reduction of costs and, therefore, reduction in taxi fares which, in turn, could help improve taxi business.

11.10.10 We note that presently there is no bar under the Motor Vehicles Act on registration of dieselised vehicles. In case a decision is taken to dieselise taxis only, not private cars, it would need an appropriate amendment to the Motor Vehicles Act. Evidently, demand for dieselisation is linked with savings in operational costs because of current differential pricing of petrol and diesel, which is not related to resource cost. Following our suggestions to rationalise price of diesel to reflect the resource cost, if price of diesel is raised and price differential between petrol and diesel is narrowed, dieselisation of taxis may not be worthwhile. Even if the present price differential remains, our analysis shows that overall savings in operational costs would be around 20 paise per vehicle km (or 5 paise per seat km in shared taxis) whereas additional capital cost of changing the present petrol-engine to diesel-engine would be around Rs. 15,000. Further, from the angle of fuel economy, dieselisation of taxis in our view, would not be of any help. The estimated consumption of petrol by taxis being less than 15 per cent of the total petrol consumption, possible petrol savings would not be large. Actually, dieselisation of taxis would add to pressure of demand on diesel, the supply of which in our refinery process, has a severe constraint. In view of the difficult diesel position, we are not in favour of dieselisation of taxis for the present.

11.11 Containerisation

11.11.1 In international trade, growth of containerisation has replaced conventional fragmented transport systems by an integrated system. This technological transformation, coupled with modernisation of rail and road transport as well as improvement of transport procedures, has led to a multi-modal transport system, which is increasingly being resorted to in many parts of the world. Containerisation in our country began in 1973 and has grown substantially with a number of containers being handled at ports like Calcutta and Haldia, Bombay, Cochin and Madras. The provision of full-fledged container handling facilites at ports, setting up of container freight stations in port towns, establishment of inland container depots at important, commercial and industrial centres in the interior, proper connections by rail and road, provision of adequate number of bogie flat wagon by railway and requisite type of road vehicles-all these are essential for its growth. The role of road transport in container traffic is essentially of road movements at railway goods sheds and stations, air cargo complexes, and their hinterland, sea ports and their hinterland, and places where inland container depots are proposed to be set up, linking them with terminals of different modes of transport.

11.11.2 We consider that suitable road vehicles such as tractor-trailers for carrying ISO containers need to be made available to facilitate container traffic and that either the public sector or private agencies should be encouraged to operate such services. In this connection, the first logical step would be to plan and develop inland containert erminals and provide for high capacity cranes to handle containers. It is also essential to identify road routes on which container traffic will flow and suitably strengthen them.

11.12 Bullock Carts

11.12.1 Carts driven by animal power, namely, bullock carts, buffalo carts, horse carts, camel and mule carts are an important and sometimes the only means of transport in rural and semi-urban areas. While bullock and buffalo carts are com-

monly used throughout the country, camel carts are limited to Rajasthan, Gujarat, parts of Haryana and Delhi. Horse carts mostly ply in semi-urban or urban areas. The bullock cart is a multi-purpose vehicle and is used for both passenger and goods movement. Such carts are used as a sort of private carrier by owner-farmers to transport farm produce, fodder, firewood, fuel, fertilisers and seeds, vegetables, construction material and a variety of consumer goods between villages and market centres. In semi-urban and certain urban areas they are also used for commercial freighting of vegetables, garbage, general merchandise, grocery, construction materials, etc. According to a study, 80 per cent of bullock carts in urban areas have pneumatic tyres. Horse-drawn carriages are usually employed in passenger transport for short distance, intra-city and inter-village travel. According to an estimate by a research institution, there are presently about 80 m. work animals in the country, comprising 70 m. bullocks, 8 m. buffaloes, 1 m. camels and 1 m. horses, besides donkeys and mules. The total number of bullock carts is estimated at 13 m. The volume of freight traffic handled by animal power annually is estimated at about 10 b. tonne-kms.

11.12.2 By its style of operation and speed the bullock cart has traditionally been operating in rural areas not in competition with but as an extremely useful complementary means of transport. This is because it mostly operates in interior areas where there are either no roads or have kutcha roads. Most importantly, bullock cart has the advantage of being a multi-purpose equipment as bullocks are used both for tilling land and in cart for transport purposes when they are not required for farm work. The traditional bullock cart has one or two animals for haulage and can carry between 0.5 to 1 tonne of load at a time. Normally, it plies within a radius of 10 to 25 kms. The new improved carts, which have roller bearings, rubber tyres and part-metal body, however, can carry loads in the range of 1 to 2 tonnes. The difference in the cost of two types of carts is substantial. Whereas the trational bullock cart costs between Rs. 800 and Rs. 1500, the cost of the improved one varies between Rs. 2000 and Rs. 3000. The latter is generally owned by relatively well-off farmers.

11.12.3 Because of our emphasis on expansion of rural roads programme and in view of severe energy constraint, we consider that the bullock cart has assumed added significance, especially in rural transport system of the country, We also expect that it will continue to be significant for many years to come, as most rural roads would be either kutcha or unsurfaced where motor transport may not be able to operate. We recommend that, mainly on energy considerations and due to its advantages of convenience and flexibility of operation, bullock cart as a complementary means of transport in rural and semi-urban areas must be encouraged.

Bullock Cart Design

11.12.4 Many suggestions have been made to us to improve bullock cart design with a view to raising its output and speed and reducing strain on the animal. Suggestions regarding improvement of cart design include switchover to pneumatic and rubber tyres to eliminate adverse impact of narrow-rimmed wheels on roads, introduction of ball-bearing system in the wheels, springs, axles and increased pay-load. For reducing strain on the animal, devices like use of leather belt around the animal's neck instead of conventional wooden yoke weight by use of a harnessing device which floats when the cart starts moving, incorporations of a third wheel which might reduce burden on the neck of the animal and provision of appropriate braking system have been indicated. We note that research institutions and organisations have been working on development of a modified version of bullock cart. A Steering Group has also been set up in the Roads Wing of the Ministry of Shipping and Transport to co-ordinate research in bullock cart design. While switch-over to pheumatic tyres may gradually take place with construction of well-paved roads in rural areas, as has happened in urban areas, it is important that improved cart design must suit all kinds of roads, animals and loads. Secondly, cost of the improved bullock cart should be well within financial capacity of the agriculturists, as bullock cart is not used for commercial purposes. Thirdly, improvement in cart design should be such as could easily be adapted by farmers and it must not throw out of employment rural artisans or carpenters, who are at present making and repairing these carts.

In view of crucial importance of bullock carts, we would suggest that adoption of improved version of such carts may be incorporated under integrated rural devolopment programme along with that of rural roads.* As rural carts are functional, farmers are not likely to divert money from buying cattle, fertilisers, seeds or other agricultural inputs to purchase a modern version of bullock cart. It is, therefore, necessary that such a promotional scheme also includes provision of financial assistance to farmers through loan assistance.

11.13 Road Safety

11.13.1 Road accidents have become a daily feature the world over. It is estimated** that road accidents accounted for about 17 per cent of all deaths in 15 developing countries. There are also accidents causing serious physical or mental disability to victims Growth in the rate of such accidents, particularly in big cities and on highways, has been of grave concern and has helped create greater awareness of road safety regulations. Road accidents in India have shown a steep rise in recent years. Growing population, relatively faster growth of motor vehicles, and road traffic vis-a-vis road system and greater complexity of vehicular traffic on roads have all contributed to push up accident, specially mortality rates. Incidence of accidents is particularly high in metropolitan cities, which are also the large transport centres in the country. Available data on road accidents in India since 1960 is shown in table 11.7.

Table 11.7

Road Accidents in India

Year	No. of motor vehicles (000 Nos)	No. of accidents (000 Nos)	No. of accidents per 100 vehicles	Casualties (000 Nos)		
				Killed	Injured	Total
1	2	3	4	5	6	7
1960	664	55.5	8.3	5.1	33.7	38.8
1968	1488	102.2	6.9	10.8	58.4	69.2
1974	2441	115.1	4.7	13.9	67.3	81.2
1975	2666	112.3	4.2	16.2	77.6	93.8
1976	2992	121.8	4.0	17.2	88.1	105.3

Source : Ministry of Shipping & Transport (DTR).

Road accident casualties in terms of absolute numbers have increased from 38,800 in 1960 to 1.05 lakh in 1976, with every sixth or seventh casualty being fatal. However, accident rate in relation to growth in motor vehicles has shown a decline from about eight accidents per 100 vehicles in 1960 to four in 1976.

11.13.2 Accidents are caused either due to fault of the driver, defect in the vehicles or bad roads, or a combination of any of these factors. They are also caused by overhanging and protruding loads which are carried without proper warning. Table 11.8 attempts to identify primary causes of road accidents for the years for which data by causes of accidents ares available.

*See Chapter 10.

** According to Transport and Road Research Laboratory, U. K.

Table 11.8

Road Accident in India by Primary Causes

(Figures in Nos)

Classification	1969	1970	1975
1	2	3	4
1. Total No. of accidents*	71,716	88,357	76,674
2. Fault of human element	47,871 (66.75)	60,867 (68.89)	53,415 (69 67)
3. Fault of vehicles/mechanical defects	2,845 (3.97)	3,014 (3.41)	3,308 (4.31)
4. Defective road system	745 (1.04)	1,104 (1.25)	857 (1.12)
5. Bad weather conditions	748 (1.04)	1,108 (1.25)	879 (1.15)
6. Other causes and causes not identified	19,507 (27.20)	22,264 (25.20)	18,215 (23.75)

Source : Primary data from Ministry of Shipping & Transport (DTR)

Note :—* Data are incomplete and relate to accidents for which break-up by cause is available.
Figures in brackets indicate percentage to total.

Fault of human element accounts for a majority of road accidents. These arise because of non-observance of traffic regulations, negligent or rash driving, driving under strain or fatigue, drunken driving and defective vision or health. Fault in the vehicles, such as stalling of engine, failure of brakes, worn-out tyres and electrical or signal defects, accounts for about 4 per cent of accidents. Defective road conditions (sub-standard road design, geometrics and defecive road signs) and bad weather conditions together account for only 2 to 2.5 per cent of accidents Other causes accounting for about 25 per cent of accidents include overloading of vehicles, collision with cattle and poor lighting at night. Reasons for a high accident rate in large cities are spurt in vehiele population in relation to road space, hetrogeneous traffic mix, lack of road signals, non-observance of traffic regulations, absence of cycle tracks, footpaths and zebra crossings. We gather that such road accidents in eight cities of Delhi, Bombay, Madras, Calcatta, Hyderabad, Bangalore, Pune and Chandigarh together, account for over 30 per cent of total road accidents in the country.

Remedial Measures

11.13.3 As human element is the main cause of road accidents, sefety measures, in our view, must aim at paying adequate attention to pedestrians, cyclists and drivers of motor vehicles. The pedestrian and the cyclist who have hitherto been neglected in road traffic planning should now be given greater attention. Adequate space for footpaths, provision of sub-ways or overbridges and zebra crossings on busy roads, and adequate cycle tracks in big cities must be provided. There is also need to ensure their maximum use by respective users, both, through road safety education and legal measures.

Driver Education

11.13.4 Proper education and training of

drivers of heavy vehicles can considerably reduce incidence of accidents. As nearly five lakh persons are given new licenses each year for driving vehicles (including heavy vehicles), the present position of a limited number of "driving schools" with inadequate equipment appears much below requirements. The State Governments may consider giving encouragement to private sector entrepreneurs to establish more driving schools with modern equipment* and training at these institutions should be made obligatory for grant of driving licenses. At the same time, it is also essential that charges for such training are kept within the means of common people. If necessary, the State Governments may consider providing financial grants to motoring schools.

11.13.5 Presently, the minimum age for holding a driving license is 18 years and a certificate of medical fitness is required from the applicant for professional driving licenses. For non-professional drivers, a self-assessment of medical fitness is considered adequate. The period of validity of a license is three years for professional drivers and five years for private motor owners. The driving license is issued after the motor vehicles inspector conducts a brief driving test of the applicant and ascertains orally his knowledge about road signs, traffic rules and regulations. We understand that a proposal is under consideration of the Government for lowering the age-limit for holding a licence from 18 years to 16 years.

11.13.6 Keeping in view the need for traffic safety, we are of the view that reduction in the age for driving license from the exisiting 18 years to 16 years, is inadvisable for the present, as irresponsible and negligent driving causes a majority of accidents. We also consider that improvements in the procedure for grant of driving licenses are called for. There should be a uniform policy regarding educational qualifications, health and medical fitness norms and standards of training. The inclusion of a proper test on traffic rules, regulation and signs would further ensure minimum educational standards for future applicatnts for driving licenses. Familiarity with the highway code evolved by the Ministry of Shipping and Transport should also be made obligatory for securing a driving licence. We should also stress that the medical fitness test, especially vision norms, should be uniformally prescribed and enforced. For drivers of commercial vehicles beyond the age of 50, medical examination should be compulsory and, in such cases, validity of a driving licence should be reduced to two years but renewable periodically. Suitable system of recording driver's performance on the license could be devised for accident-free driving and this should be taken into account before renewal of their licences.

Other Measures

11.13.7 For ensuring road worthiness of vehicles, a thorough and strict check of commercial vehicles at the time of issuing fitness certificates is essential. Secondly, automobile manufacturers may consider inclusion of safety belts, collapsible steering assembly, speed governors and other safety devices in vehicles.

11.13.8 We consider that for improvment of traffic signs and rectification of defects of road geometrics, traffic engineering cells should be set up in State PWDs in every State and road planning authorities should regularly conduct surveys to identify and mark prominently traffic accident spots and accident-prone road sections. This would help instal advance warning signs to road users. It is important that highway engineers are increasingly associated with land-use and traffic planning so that important aspects of road safety, such as, traffic signals, traffic signs, cycle tracks, pedestrian crossings and pavements, are appropriately provided. The traffic signs would become more effective if they are exhibited through visual aids with diagrams, in accordance with international standards rather than putting them up in different languages. Similarly, the numbering of plates on vehicles should be in one language throughout the country. Further, the traffic authorities should strictly enforce traffic regulations, particularly regarding overloading of vehicles. If inadequacy of staff is the reason for tardy enforcement, traffic police strength should be augmented and additional equipment and vehicles, such as, ambulances, provided for them. In areas where traffic is heavy, traffic police should be reinforced and helped by a squad of mobile safety police. The traffic police force should periodically be trained in traffic engineering techniques, and human relations. They should also be empowered to impose fines and

* Such as simulation machines for training learner drivers in vogue in some countries abroad.

penalties on the spot up to a limit for minor traffic offences or a system of compounding such offences can be provided in the Act. The power to impose fine should not, however, be exercised by less than a Head Constable. This would reduce cumbersome procedure of booking offenders, punishing them, and lower the burden of traffic cases in law courts and help expedite disposal.

11.14 Summing Up

11.14.1 Road transport being geographically the most pervasive and of great significance to surface transport system of the country, we attach importance to its systematic development to enable it to meet the growing demands. The Motor Vehicles Act 1939, whose restrictive character has lost relevance, should be revised so that it becomes an instrument for promoting an efficient, adequate and safe road transport system.

11.14.2 The permit system which regulates commercial motor transport under the Act needs to be radically changed, simplified and liberalised. All the State Governments may seriously consider the possibility of abolishing intra-state permit system particularly for goods vehicles and streamlining that of inter-state permits so that it takes an applicant not more than a month or so to secure the permit. Once the system of regular permits becomes efficient, the current malpractice of securing a large number of temporary permits and their frequent renewal and misuse as regular permits, would be obviated.

11.14.3 We support the national and zonal permit schemes as they facilitate smooth inter-State and inter-regional movement of goods by road. Permits under these schemes should be issued liberally but on payment of all taxes to each of the States to which they are applicable.

11.14.4 In the interest of road safety, fuel economy and avoidance of congestion in metropolitan centres, construction of truck terminals is absolutely essential at big transport centres where godowns, offices of goods booking agencies workshop facilities and rest places for drivers and conductors, could be located with advantage. Development of such terminals or "auto nagars" should form part of the road transport development plans of the State Governments.

11.14.5 Performance of public sector undertakings varies considerably in different States. By and large, the non-hilly and non-city services have done well even though their financial results have not been satisfactory. We emphasize the need to improve their output, quality of service and profitability through management efficiency and freedom to charge economic fares. Keeping in view financial constraints and the need to eliminate losses in these undertakings, we stress on consolidation, and any further nationalisation should proceed on a well-formulated plan. We do not favour nationalisation of goods transport by road and suggest that the continuation of limited, uneconomic goods transport services in public sector in some of the States be reviewed.

11.14.6 In view of steep rise in road accidents in our country, particularly on highways and in big cities, urgent remedial measures are called for. The pedestrian and cyclist, who have hitherto been neglected in road traffic planning, should now be given greater attention. Intensification of road safety drives, driver education and strict enforcement of traffic regulations are essential. Accident-prone sections of roads need to be marked and road signs should increasingly be exhibited through visual aids. We also emphasize the need for adequacy of traffic police and for improving their operational efficiency.

Number of Motor Vehicles registered in India by types of vehicles

Year	Two Wheelers	Three Wheelers	Cars	Jeeps	Taxis	Buses	Goods vehicles	Miscellaneous vehicles	Total
1	2	3	4	5	6	7	8	9	10
1950-51	26860	*	147712	*	11551 (3.77)	34411 (11.23)	81888 (26.73)	3891	306313
1960-61	88360	6235	256243	31670	21663 (3.26)	56792 (8.55)	167649 (25.23)	35863	664475
1970-71	575893	36765	539475	82584	60446 (3.24)	93907 (5.03)	342577 (18.37)	133668	1865315
1971-72	656390	41882	585372	87539	66954 (3.27)	99394 (4.86)	363889 (17.80)	143461	2044881
1972-73	734569	56939	579779	65892	62916 (2.98)	98637 (4.67)	308462 (14.60)	205865	2113059
1973-74	838476	67231	601647	76544	68844 (2.99)	101792 (4.42)	323291 (14.04)	225596	2303421
1974-75	936338	74794	590838	92866	76814 (3.15)	99800 (4.09)	333673 (13.67)	236370	2441493
1975-76	1045428	85787	601823	94132	78804 (2.96)	106349 (3.99)	344093 (12.91)	309178	2665594
1976-77	1237308	97756	660756	87450	78898 (2.64)	116939 (3.90)	367202 (12.27)	346157	2992466
1977-78	1395525	113870	667763	102395	76110 (2.35)	117449 (3.63)	368193 (11.38)	394415	3235720

Note : Figures in brackets indicate percentages to total vehicles.

Source : Primary data from Ministry of Shipping & Transport (DTR)

*Figures not available separarely.

Annexure 11.2

Proposals under consideration of the Ministry of Shipping and Transport for amendments to the Motor Vehicles Act—1939

Sl No.	Section No. and existing provision	Contents of the proposed amendment	Justification	Remarks
	1	2	3	4
1.	Sections 112, 113,115, 124 provides for punishment and penalities for offences. *Section 112* : Whoever violates any rule or provision of the Act, will be punished with a fine of Rs. 100 for the first time and Rs. 300 for repeated offences. This will hold if no other penalty is provided for the offence in any other section. *Section 113* : Whoever wil-fully disobeys or obstructs any person, empowered under the Act, to dis-charge his/her function can be fined uto Rs. 500 if no other penalty is provided for the offence. *Section 115* : Whoever drives or causes a person to drive a motor vehicle beyond the maximum speed (Sec. 71) will be fined [illegible]	It is proposed to provide for compounding of offence under Sections 112, 113, 115, 124 by an authority notified by the State Govt. Maximum amount of composite fine may be fixed at 50% of the maximum fine that can be imposed under each of these Sections.	The proposal to compound offences provided in these Acts will go a long way to simplify administrative work and legal procedures and thereby save time.	

1	2	3	4
Section 124 : Whoever drives a motor vehicle, whose unladen or laden weight exceeds that which is specified in the certificate of registration of the vehicle (Sec. 72) or drives a specified class of motor vehicle which is prohibited by the State Govt, in a particular area (Sec. 74) will be punished with a fine of Rs. 200 for the first offence and Rs. 100 for the subsequent offences.			
2. *Section 114 (1)* : Whoever is disqualified under the Act for holding or obtaining a driving licence drives a motor vehicle or obtains a driving licence, without disclosing the endorsements made on a driving licence held by him previously will be punishable with imprisonment upto 3 months or a fine upto Rs. 500 or both.	Amendment to include the offence of driving a vehicle without a driving licence. The punishment would be a fine upto Rs. 500 or imprisonment upto 3 months or both.	At present this offence is punishable with a fine upto Rs. 300 under Sec. 112. A stringent punishment for driving without a licence will help reduce accidents.	
3. *Section 129—A* : The power of a police officer to detain vehicles used without the certificate of registration or permit.	Cases of refusal to carry passengers when accommodation is available, misbehaviour and overcharging should be included in the list of violation of permit conditions.	The proposal would help improve discipline on the roads and provide better service to the public.	Judicial use of the powers by the police must be ensured.
4. *Section 70* : provides for the State Govt. to make rules regarding the maximum height, length, width, seating arrangements etc. of the vehicle.	The proposal is to vest these powers in the Central Government.	It would provide for uniformity in this regard throughout the country and will facilitate efficient inter-State movements.	

1	2	3	4
5. *Section 31*: provides for intimation by the transfer or if the transfer of ownership of a registered motor vehicle to the RTA is within 14 days.	The proposal is to make a provision on the lines of Sec. 61, relating to transfer of permit on the holder's death, for transfer of registration certificate in favour of the heirs of the deceased owner by the registering authority.	This will help the transfer of vehicles to the heirs without delay.	
6. *Section 11(1)* : 2nd provisio relates to the renewal of driving licence to be made in Form B of the First Schedule. Form B contains details regarding the health and eye problems of the applicant.	It is suggested that a driving licence be renewed normally until the age of 45 years. After 45 years, the driver may be required to undergo periodical medical check ups and in case a driver is not found fit to drive a heavy vehicle, he may be permitted to drive a light vehicle.	There is no need for repeated medical check ups of the drivers until the age of 45 years.	But eyesight should be tested periodically.
7. *Section 25* relates to temporary registration of a vehicle valid for a month.	The suggestion is that the validity of a temporary registration shall not be terminated merely because of a change in ownership from a manufacturer to a dealer and from a dealer to a consumer as long as there was the valid unexpired period of temporary registration.		
8. *Section 129* : Any police officer has the right to impound documents like driving licence, permit, certificate of registration, if he apprehends them to be false.	No police officer below the rank of Sub-Inspector shall be authorised to impound these documents merely for a driving offence. In such cases only driving licence need be seized.	Suggestion received by the NTPC, also urges that unless the offence is of a criminal nature, the police need not interfere.	

1	2	3	4
9. *Section 14* : Any person completing his 18th year is licensed to drive a vehicle.	The proposal is to reduce the minimum age for holding driving licence to 16 years.		Reduction of age to 16 years may increase the accident rate.
10. *Section 31-A* : Where an application for registration of a motor vehicle which is held under a hire purchase agreement is made the registering authority shall make an entry in the registration certificate.	An application for noting endorsements on the registration certificate cancellation of the endorsement should be made to original registering authority for tallying with the original signatures on record.	The purpose is to prevent misuse by anti-social elements.	
11. *Section 32* : No owner can so alter his vehicle that the particulars given in the registration certificate are changed, unless he has given notice to the registering authority and receives its approval	The suggestion is to make for intimation to be given to the hire purchase financier when alteration is recorded in the Registration Certificate. Also in the event of suspension of cancellation of a registration certificate, communication should be sent to the hire purchase financier.	Thss idea is that the hire purchase financier should know about the alteration and he can refuse the alteration if it hurts the earning capacity of the vehicle. If he does not communicate in 30 days; the consent is deemed to be given.	The hire purchase financier has financial stake in the vehicle. It is only fair that he should be informed of any changes in venicle. It will prevent future legal complications.
12. *Section 38(2)* ; A certificate of fitness shall remain effective for not less than 6 months and not more than 2 years.	The words "less than 6 months" to be substituted by the words "less than one year".	Unless there was a substantial damage to the vehicle, there is no case for reviewing the fitness certificate every 6 months.	The Punjab Govt. is considering the idea to do away with the fitness certificate as the specifications laid down in the Punjab Motor Vehicles Rules, 1940, are sufficient to ensure smooth running of the vehicles.
13. *Section 15* : If the licensing authority is satisfied that a person is :	Proposal is to amend Section 15 of the Act to authorise the licensing authorities to suspend without enquiry the	The purpose is to prevent the alleged reckless driver to continue driving during the pen-	Since the court case may take long to get decided, depriving the driver of his liveli-

1	2	3	4
(a) a habitual criminal or drunkard, (b) used a motor vehicle in the commission of a cognizable offence. (c) has by his previous conduct shown that his driving is a public menace. can disqualify the person from holding a driving licence.	licence of a driver involved in a fatal road accident, till the court verdict becomes available. (Through the 1977 Amendment the driving licence could be suspended for 6 months).	dency of court proceedings.	hood especially when he is the sole bread earner of his family and when it is his first offence, it may be quite hard to do so.
14. *Section 70* : relates to the power of the State Govt. to make rules regarding construction, equipment, maintenance of road vehicles.	State Govts. should require owners of all vehicles to instal standard quality automatic dippers. The owner of a vehicle (other than motor cycle or tractor) with right hand steering also should instal electrical indicators.		These measures will make for safer driving.
15. *Section 2(29)* : A 'Stage carriage' means a motor vehicle adapted to carry more than 6 persons, for hire or reward, excluding the driver at separate fares paid by individual passengers either for the whole or stages of the journey.	Definition of stage carriage should be amended as follows : "Stage carriage means a omni bus which carries passengers for hire or reward at separate fare paid by or for individual passengers either for the whole journey or for stages of the journey".	This is to simplify the existing definition.	
16. *Section 129A* : Any authorised police officer can detain a vehicle, if it possesses no certificate of registration or permit or violates any condition of the permit like changing the route etc.	It is proposed to provide for confiscation of a motor vehicle if it is proved that it is involved in the commission of a cognizable offence like carrying stolen goods.		This proposal will help prevent unlawful, anti-social activities. A suggestion made by the U.P. Govt. is that vehicles plying with forged permits should be confiscated.

1	2	3	4
17. *Section 60* : The Transport Authority can cancel or suspend a permit if it feels that (a) there is a breach of any condition laid down in the permit, (b) if the permit holder uses the vehicle in an unauthorised manner, (c) the permit holder ceases to own the vehicle, (d) the permit holder has obtained the permit by fraud, (e) if he acquires citizenship of a foreign country.	The TDC has recommended that provision should be made for delegation of powers to the Chairman or a Member of the Transport Authority to cancel permits or compound offences relating to it. Any order for suspension or cancellation of permits must be brought before the RTA/STA within one month and should be ratified within this period. The Chairman can overrule any order passed by the Secretary or Members of the Authority.	The proposal would give more power to STA but the limit for disposal of cases concerning suspension and cancellation would ensure speedy disposal.	Under Section 60, the Authority is found to hear the owner in case of suspension of permit but not in the case of cancellation. This also should be included as suggested by Provincial Motor Transport Association Bombay.
18. *Section 38* : A transport vehicle will be validly registered only when it carries the fitness certificate.	STUs should be vested with the power of issuing fitness certificate for their own vehicles.		This involves the broad question whether the STUs should or should not be accorded regulatory powers or preferential treatment.
19: *Section 2(10-A)* : An invalid carriage means a motor vehicle, unladen weight of which does not exceed 300 kgs, adapted for the use of a physically handicapped person.	A new definition of 'invalid car' may be inserted in the Act as under :- "Invalid cars mean cars fitted with special control/gadgets specially made for operation by disabled persons". Also proviso (a) to Sec. 7(5) of the M.V. Act may be amended so as to provide a driving licence (limited to invalid carriage or car) to an applicant suffering from diseases specified in the 2nd Schedule (like epilepsy, lunacy etc.). This too will be issued only if the licensing authorities think he is fit enough.	The advantage of creating a special classification for invalid car will mean that the State Govt. can exempt such cars from taxes.	

Factors influencing operational performance of State Road Transport Undertakings

The purpose of this exercise is to identify the factors which could significantly influence the performance of the State transport undertakings. Although the profit earned by an undertaking is usually regarded as an index reflecting its performance efficiency, this cannot be an objective criterion since a technically efficient undertaking could incur losses as a result of its fares policy, which is beyond its control. Hence it was decided to take the costs of operations per unit of output as the criterion for judging the performance. Even here, the element of taxation which is an exogenous factor to operational costs should be excluded. Accordingly, costs net of taxes appears as an effective criterion for judging the relative performance of several undertakings, by observing the effects on costs by a set of independent variables which are within the purview of the management policy, like fleet and vehicle utilisation and load factor which are beyond the control of management such as the nature of operations, density of buses, or the ratio of surfaced to total roads in the State.

2. On the basis of cross-section data collected for 31 public sector road transport un ertakings for the year 1976-77 costs net of ta des per pkm, and the components of costs such x as the fuel, personnel, material, depreciation, nterests and other costs per unit of output were co1mputed. It was observed that there was considerable variation in the costs between the different undertakings. Details of cost differences are appended at the end of this annexure*. The co-efficient of variations of total cost and its components were derived. They are given in table 1 below.

Table 1

Coefficients of variation for the cost of operations and its components

	Variable	Arithmetic mean (in paise)	Standard deviation	Coefficient of variation %
	1	2	3	4
	Cost net of taxes per Pkm	5.61(100)	2.23	40
	Components			
1.	Fuel cost per Pkm	1.21(21.5)	0.67	22
2.	Personnel cost per Pkm	1.81(32.2)	0.86	47
3.	Material cost per Pkm	1.25(22.3)	0.60	48
4.	Depreciation per Pkm	0.62(11.0)	0.33	54
5.	Interest charge per Pkm	0.46(8.3)	0.43	92
6.	Other costs per Pkm	0.26.(4.7)	0.22	84

Note : Figures in parenthesis indicate the respective percentage to total cost net of taxes.

*At page 220 and 221

(Annexure 11.3 Contd)

It may be observed that personnel cost constitutes the largest share (32.2 per cent) in total cost net of taxes, followed by material cost, fuel cost, depreciation, interest charges and other costs, in that order. Fuel cost has the least variation among undertakings, and interest charge has the highest variation followed by other costs and depreciation costs.

3. Regression analysis was attempted for the cross-section data. Separate regression were tried for costs net of taxes, and the different components of costs—fuel costs, personnel costs, material costs, depreciation, interest charges and other costs as dependent variables, on a number of factors as below :

i) C—T =f (Size, FU, VU, L, A, D, S, R)
ii) FC =f (TKM, FU, VU, A, D, S, R)
iii) PC =f (Size or TKM, R)
iv) MC =f (Size, FU, VU, L, A, D, S, R)
v) Dep =f (Size, R)
vi) Int. =(Size, R)
vii) O = f (Size, R)

Note : Where notations indicate the following :—

C—T = Total costs net of taxes } per Pkm
FC = Fuel Costs } per Pkm
PC = Personnel Costs } per Pkm
MC = Material Costs } per Pkm
Dep = Depreciation Charges } per Pkm
Int = Interest Charges } per Pkm
O = Other Costs } per Pkm
PKM = Passenger Kilometers
TKM = Total effective kilometres of fleet
Size = Number of vehicles (size of fleet)
FU — Fleet utilisation (in percentage)
VU = Vehicle utilisation (in percentage)
L = Load factor (in percentage)
A = Percentage of overaged fleet to total fleet
D = Density of buses per lakh of population in the State
S = Ratio of surfaced to total roads in the State
R = Dummy variable taking value of 1 for city services, 2 for services in hilly States and 0 for others.

Regression Results

4. Both linear and non-linear regression were attempted. It was observed that linear regression gave better fits. Accordingly the results of linear fits are given below :—

(i) **Cost net of taxes per PKm**

(a) $$C-T = \underset{(3.88)}{13.60^*} - \underset{(1.29)}{0.0003\,Size} - \underset{(2.25)}{0.046FU^*} - \underset{(1.96)}{0.00003VU^*} - \underset{(0.78)}{0.026L} + \underset{(0.52)}{0.015A} + \underset{(0.99)}{0.013D} - \underset{(0.90)}{0.005S} + \underset{(2.34)}{0.726R^*}$$

$\bar{R}^2 = 0.83$

Thus the two significant factors which appear to influence the costs were fleet utilisation and vehicle utilisation. The effect of dummy variable was also significant, implying that the operative costs also differ as a result of urban or inter-urban services. The other variables like the size of the fleet, load factor, proportion of overaged buses in total fleet, density of buses with regard to population and the proportion of surfaced roads to total roads have no significant effect on costs of operations. Another regression was attempted taking only the significant variables as the causative factors, the results of which turned out as :—

(b) $$C-T = \underset{(6.32)}{10.70^*} - \underset{(3.80)}{0.00070FU^*} - \underset{(2.65)}{0.00001VU^*} + \underset{(5.11)}{1.638R^*}$$

$\bar{R}^2 = 0.80$

The regression fitted values of 22 undertakings out of the total 31 undertakings were within the range of 10% over-estimation/underestimation from the observed values.

(ii) **Fuel Costs per PKm**

The regression results according to the model earlier mentioned and a revised fit with significant variables only are given below :—

*Significant at 5% level.
Figures in brackets are 't' values.

(Annexure 11.3 Contd)

(a)
$$FC = 1.87^{*} - 0.00005TKM - 0.005FU^{*}$$
$$(7.51) \quad (1.77) \quad (2.36)$$
$$-0.000002Vu + 0.001A + 0.0004D$$
$$(1.09) \quad (0.40) \quad (0.27)$$
$$-0.003S^{*} + 0.0113R^{*}$$
$$(1.97) \quad (2.05)$$
$$\bar{R}^{2} = 0.80$$

(b)
$$FC = 1.73^{*} - 0.007Fu^{*} - 0.002S^{*} + 0.204R^{*}$$
$$(9.07) \quad (2.99) \quad (1.98) \quad (5.42)$$
$$\bar{R}^{2} = 0.79$$

It was observed that the regression fits of 23 undertakings fell within the range of 10% of over-estimate/underestimate from the observed data. From the above, it appears that fuel costs are influenced to a large extent by fleet utilisation, the type of roads on which services are operated and the terrain of operations.

(iii) Personnel Costs per PKm

The regression results as specified in the model and with significant variables only, were as follows ;—

(a)
$$PC = 3.42^{*} - 0.00003\ Size - 0.022\ Fu^{*}$$
$$(3.45) \quad (0.42) \quad (1.99)$$
$$+0.547R^{*}$$
$$(2.91)$$
$$\bar{R}^{2} = 0.54$$

(b)
$$PC = 3.29 - 0.023Fu^{*} + 0.571R^{*}$$
$$(4.12) \quad (2.24) \quad (3.26)$$
$$\bar{R}^{2} = 0.55$$

In the case of personnel costs, the estimated value of only 9 undertakings out of the total were within 10% of overestimation/underestimation from the observed values. Here, fleet utilisation and the terrain of operations turned out to be significant.

(iv) Material Costs per PKm

The model fitted indicated that the size of the fleet, vehicle utilisation and the ratio of surfaced to unsurfaced roads in the States, emerged as significant variables as is evident from the following :

(a)
$$MC = 2.83^{*} - 0.00007\ Size^{*} - 0.019Fu$$
$$(5.41) \quad (1.99) \quad (1.44)$$
$$-0.000006\ Vu^{*} + 0.002L + 0.002A$$
$$(2.72) \quad (0.02) \quad (0.28)$$
$$+0.002D - 0.009S^{*} + 0.098R$$
$$(0.65) \quad (2.35) \quad (0.63)$$
$$\bar{R}^{2} = 0.60$$

and

(b)
$$MC = 2.75^{*} - 0.0001\ Size^{*} - 0.00001Vu^{*}$$
$$(7.29) \quad (2.12) \quad (2.78)$$
$$-0.0086S^{*}$$
$$(2.90)$$
$$\bar{R}^{2} = 0.53$$

(v) Depreciation, Interest and other Costs

Significant results did not emerge in respect of the models concerning the above elements of costs.

Summing Up

5. The study indicates that the two important factors which are under the control of management policy, namely, fleet and vehicle utilisation affected the costs of operations. (fleet utilisation is related inversely to costs net of taxes, personnel costs and fuel costs; vehicle utilisation is related inversely to costs net of taxes and material costs.)

Besides these, such factors as ratio of surfaced to total roads and the terrain and nature of operation as in hilly states or in city affected operations of the undertakings.

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*Significant at 5% level.
Figures in brackets are 't' values.

(Annexure 11.3 Contd)

Performance Indicators of Road Transport Undertakings for the year 1976-77

	Undertaking	Size No.	FU %	T.K.m. Lakh Km	V.U. per year km	Load Factor %	P.K.m. Millions	A	D
	1. Haryana	1911	95	1664	91687	87	7239	0	18.87
	2. Punjab	1895	85	1346	83558	89	5990	0	27.81
	3. Pallavan (D)*	355	86	354	115908	77	1370	8	22.15
	4. Cheran (TN)	598	85	533	104931	80	2132	23	22.15
	5. Orissa	646	85	375	68377	80	1502	18	4.96
	6. Pepsu	794	86	522	76330	83	2167	0	27.81
	7. Cholan (TN)	479	85	498	122356	70	1743	33	22.15
	8. M.P.	2208	82	1465	81111	67	4907	34	9.51
	9. Kerala	2284	86	2029	102922	83	8419	19	38.57
	10. Gujarat	5201	77	3973	98595	76	15099	21	25.07
	11. U.P.	5406	80	3098	71623	70	10842	10	12.33
	12. Katta Boman (TN)	535	83	522	118149	62	1619	12	22.15
	13. Rajasthan	1530	77	1219	103472	72	4388	7	18.93
	14. J. & K.	568	75	226	53164	70	716	22	38.01
	15. Maharashtra	7785	82	4894	76405	78	19086	49	24.30
	16. A.P.	4201	93	4278	109155	71	15186	19	16.91
	17. Karnataka	4338	77	3142	94548	72	11311	34	31.68
	18. Bihar	1637	55	680	76193	63	2143	11	7.10
	19. Assam	533	74	277	69771	79	875	9	16.99
	20. H.P.	776	76	347	58342	80	1109	20	49.99
	21. North Bengal	107	43	21	45696	100	84	11	N.A.
	22. Meghalaya	297	61	182	99989	76	553	41	23.27
	23. Tripura	55	71	27	68410	79	84	0	20.68
	24. Manipur	89	39	19	53343	55	41	17	24.94
	25. CIDCO	72	85	82	134475	73	299	8	24.30
C I T Y	26. Pallavan (M)**	1434	87	990	79641	73	3613	8	97.16
	27. DT.C.	2247	70	1390	87830	88	6118	10	61.79
	28. Pune	342	86	230	78316	71	817	12	49.07
	29. Ahmedabad	595	78	299	64409	80	1198	15	N.A.
	30. B.E.S.T.	1650	90	1203	80955	85	5113	10	N.A.
	31. Calcutta	971	62	355	59012	108	1918	21	118.23

(Annexure 11.3 concld.)

S	R	TR	TC	C-T	FC	PC	MC	DEP	INT	OTHER (Costs)
		PAISE PER PKM								
0.61	0	3.87	3.72	3.04	0.98	0.86	0.62	0.26	0.22	0.10
0.70	0	3.40	3.75	3.38	1.04	0.89	0.73	0.41	0.21	0.10
0.56	0	5.01	5.15	3.91	1.09	1.21	1.01	0.29	0.14	0.17
0.56	0	5.30	5.07	4.02	1.00	0.95	1.07	0.58	0.13	0.29
0.30	0	4.45	4.40	4.05	0.93	1.35	1.94	0.40	0.43	0.04
0.70	0	3.75	4.46	4.11	1.19	1.03	0.95	0.42	0.41	0.11
0.56	0	5.31	5.28	4.11	1.20	1.20	1.17	0.54	0.17	0.30
0.47	0	5.95	5.86	4.27	1.01	1.20	0.97	0.47	0.34	0.13
0.22	0	4.80	4.93	4.28	1.01	1.74	0.87	0.27	0.18	0.21
0.60	0	5.72	5.87	4.46	0.94	1.68	0.83	0.37	0.17	o.14
0.31	0	5.31	5.11	4.49	1.03	1.54	0.91	0.66	0.35	0.00
0.56	0	5.87	5.79	4.60	1.33	1.59	1.04	0.35	0.13	0.16
0.48	0	4.61	4.72	4.61	1.06	1.30	1.28	0.50	0.33	0.14
0 44	2	4.92	5.03	4.68	1.24	1.51	0.60	0.61	0.21	0.51
0.47	0	6.44	5.90	4.70	1.03	1.58	1.20	0.45	0.21	0.23
0.51	0	5.80	5.64	4.74	1.05	1.63	1.03	0.59	0.14	0.30
0.56	0	5.75	5.71	4.94	1.14	1.65	0.85	0.53	0.21	0.56
0.13	0	6.08	7.30	5.97	1.34	1.99	1.19	0.75	0.58	0.12
0.13	2	6.67	6.64	6.20	1.20	2.26	1.31	0.92	0.25	0.26
0.18	2	6.78	7.84	7.53	1.69	1.90	2.13	0.97	0.38	0.46
0.23	2	7.49	9.39	8.32	1.90	2 02	2.50	0.69	0.89	0.56
0.22	2	5.17	8.56	8.50	1.68	3.22	1.52	1.55	0.48	0.00
0.22	2	7.24	9.02	8.90	1.42	2.14	2.49	1.16	1.27	0.42
0.17	2	9.49	13.63	13.38	1.95	4.87	3.16	1.62	1.05	0.73
0.47	0	3.34	3.27	3.11	0.84	0.73	0.70	0.46	0.38	0.00
0.56	1	5.78	5.83	5.12	1.23	1.78	1.21	0.38	0.25	0.27
0.91	1	3.83	5.54	5.33	1.04	1.75	0.90	0.55	1.06	0.03
0.47	1	5.96	6.17	5.81	1.25	2.57	0.99	0.32	0.46	0.22
0.60	1	5.58	6.54	6.31	1.22	2.95	0.78	0.46	0.75	0.15
0.47	1	7.32	7.71	7.22	1.19	2.72	0.94	0.95	0.50	0.92
0.91	1	4.51	10.10	9.95	1.26	3.34	1.77	0.64	2.16	0.41

Source : Primary data from Ministry of Shipping & Transport (DTR) ; Association of State Road Transport Undertakings ; Finance Commission Repot 1978.

*(D)...Pallavan (District) Taml Nadu (TN) Tamil Nadu

**(M)...Pallavan (Metropolitan) Tamil Nadu

Note : Notations have the same interpretations as in page 218 ; TR denotes Total revenue earned per PKM ; TC denotes Total cost per PKM.

Chapter 12

Urban Transport

12.1 A Historical Perspective

12.1.1 As a subject urban transport has gained importance in India only recently, though the problems of metropolitan transport, particularly in Calcutta and Bombay, have been engaging attention since independence.

12.1.2 Realising the difficulties faced by commuters at the two suburban teminals at Sealdah and Howrah, a Terminal Facility Committee was constituted in 1947 under the chairmanship of Sir Padamji Ginwalla. This Committee recommended the scheme for a circular railway for Calcutta. Subsequently, the French Company report (1949), the Roy report (1953), the Sarangpani Committee report (1956), the Frieling report (1964) and the Garbutt report (1966) examined various aspects of Calcutta's transportation problems.

12.1.3 The Maharashtra Government appoin-Std a Committee under the chairmanship of Shri .eoG. Barve inter alia to analyse the difficulties ccmmuters were facing and suggest measures to heck growth of iudustrial development in the Bombay area. In its report of 1959, the committee made a number of suggestions. This was followed by report of ILO Mission (1962), Bombay traffic and transportation study by Wilbur Smith and Associates (1963) and the report of Gadgil Committee which perpared a regional plan for Bombay Panvel region (1966).

12.1.4 These studies were, however, not based on any comprehensive engineering and economic analysis of the problems. In 1965 it was recognised that metropolitan transport problems had grown rapidly and weie becoming increasingly complex and urgent, specially in Calcutta, Bombay, Madras aud Delhi. It was also elt hteat mass transportation requirements in a largt city were bound up, to a considerable exten, with the shape and direction of future plan of urban development and location of industrial and other activities. It was necessary, therefore, to take a long-term view of transportation requirements for such cities as Bombay, Calcutta, Madras and Delhi. Accordingly, the Planning Commission set up in September 1965 a Study Team on Metropolitan Transport. The team was entrusted with the work of assessing the adequacy of existing transport facilities, including roads, road transport and rail transport, in relation to present needs in these four cities, and determining their long-term requirements of transport, having due regard to overall plans of metropolitan development and location of industrial, commercial and other activities. The team was also asked to assess feasibility of various proposals and recommend phased programmes of integrated development of the facilities needed, including costs and returns, methods of financing, scheme of execution and appropriate administrative arrangements.

12.1.5 The Committee on Transport Policy and Co-ordination also considered transportation problems in metropolitan cities. In its report (1966) the Committee stated that in metropolitan and other large cities, it was necessary to take an integrated and long-term view of transport needs, both for passengers and goods, and to plan road development, transport services and, where necessary, suburban rail transport, as part of a comprehensive and integrated scheme. Urban transport planning, in the Committee's view, was closely related to long-term urban planning, including land use planning and location of industrial activities.

12.1.6 The Metropolitan Transport Team, which initiated comprehensive traffic and transportation studies for the major metropolitan cities and provided technical guidance to the traffic cells, was wound up in 1974. However, urban development authorities have been set up recently in metropolitan and some of the larger cities like

Ahmedabad, Hyderabad, Kanpur and Lucknow, which inter alia are entrusted with the task of studying land-use and transportation problems of individual cities.

12.1.7 Recognising the importance of urban transport planning and the urgent need to tackle difficulties presently faced in large as well as medium and small cities, we constituted a Working Group to examine in detail the various aspects of the problem and make suitable recommendations. On this subject, we also sponsored the following four studies conducted by specialised agencies and research institutions :—

1. Public transport in medium-sized urban areas—A case study of Aurangabad city—by the Central Institute of Road Transport (CIRT), Pune.

2. Objective assessment of the role of intermediate public transport in settlements of different sizes—by the School of Planning & Architecture, New Delhi.

3. Pilot study on social benefits of rail and road transport in a medium-size town—by Khosla Consultants, New Delhi.

4. Urban transport policy for large and medium-sized Indian cities—by the Indian Institute of Management, Ahmedabad.

We have drawn heavily from these reports in formulating our recommendations.

12.2 Trends in Urbanisation

12.2.1 The growth of population in India between 1901 and 1971 is shown in table 12.1. During this period total population multiplied nearly 2.3 times and urban population 4.2 times. The urban share of total population increased gradually from 10.84 per cent in 1901 to 13.86 per cent in 1941 but, thereafter, it rose comparatively faster to reach a level of 17.30 per cent in 1951. The growth in the decade 1941-51 was exceptionally high, particularly due to the impact of World War II and influx of population in 1946-47. For example Delhi's population jumped from 6.96 lakhs in 1941 to 14.37 lakhs in 1951. In the decade 1951-61 there was only a marginal increase in share of total urban population, from 17.30 per cent to 17.98 per cent. According to the 1971 census, 109.09 million or 19.91 per cent of the country's total population constituted urban population.

Table 12.1

Growth of Population : 1901-71

Year	Population (in million)			Col. (4) as% of Col. (2)	Percentage Growth		
	Total	Rural	Urban		Total	Rural	Urban
1	2	3	4	5	6	7	8
1901	238.33	212.48	25.85	10.84	—	—	—
1911	252.01	226.07	25.94	10.29	5.73	6.39	0.35
1921	251.24	223.15	28.09	11.18	(-)0.30	(-)1.29	8.25
1931	278.87	245.41	33.46	11.99	10.99	9.96	19.12
1941	318.54	274.39	44.15	13.86	14.22	11.81	31.97
1951	360.95	298.51	62.44	17.30	13.31	8.79	41.42
1961	439.07	360.14	78.93	17.98	21.64	20.65	26.41
1971	547.95	438.86	109.09	19.91	24.79	21.85	38.21

Source : **Census Reports**, Government of India

12.2.2 Details of urban growth with reference to size-category of towns, given in table 12.2 below are revealing. While the share of class I cities, with a population of 1 lakh and above, rose from 35.40 per cent in 1941 to 55.83 per cent in 1971, that of class II cities (population 50,000-99,999) and class III cities (Population 20,000-49,999) almost stagnated, and of class IV, V and VI cities (population below 19,999) registered a decline. The decline has been very sharp in case of class V and VI cities.

Table 12.2

Trends in Urbanisation (1901-71)

Year	Percentage share of urban population to total population	Percentage share of population in each size-class of towns to total urban population					
		Class I 100,000 and above	Class II 50,000-99,999	Class III 20,000-49,999	Class IV 10,000-19,999	Class V 5,000-9,999	Class VI less than 5,000
1	2	3	4	5	6	7	8
1901	10.84	22.85	11.84	16.50	23.06	20.38	6.29
1911	10.29	24.19	10.99	17.69	20.46	19.81	6.95
1921	11.18	25.31	12.43	16.89	18.91	19.03	7.43
1931	11.99	27.37	11.95	18.76	18.97	17.32	5.63
1941	13.36	35.40	11.77	17.71	16.29	15.38	3.45
1951	17.30	41.77	11.06	16.73	14.02	13.20	3.22
1961	17.98	48.37	11.89	18.53	13.03	7.23	0.95
1971	19.91	55.83	11.32	16.31	11.32	4.71	0.51

Source : **Census Reports**, Government of India—1971

12.2.3 Trends in urbanisation show that class I cities have attracted migrants not only from rural areas but from smaller towns as well. This also reflects imbalances in spatial distribution of commercial and industrial activities. The industrial units have tended to concentrate in the existing larger cities.

12.2.4 A study of 1971 census figures given in annexure 12.1 shows that the nine cities of Calcutta, Bombay, Delhi, Madras, Hyderabad, Ahmedabad, Bangalore, Kanpur and Pune, having a population of 10 lakhs and above, accounted for more than 25 per cent of total urban population. The annual growth of population in these cities during the last two decades was, however, between 3 to 4 per cent. The 35 medium-size cities in population range of 3 to 10 lakhs also registered an increase of 3.6 to 4.7 per cent during this decade. The highest growth was registered in 104 cities with a population of 1 lakh to 3 lakhs. The annual growth rate for these cities was 29.6 per cent in the decade ending 1951 and about 10 per cent in the following two decades.

12.2.5 The share of urban population as per cent of total population in selected countries of the world over the last fifty years has been shown

in annexure 12.II. In some countries urbanisation rate has been truly spectacular. For example, in Japan the percentage share of urban population increased from 18.1 in the year 1920-21 to as high a figure as 72.1 in 1970-71. In a number of countries, urban share of population in 1970-71 is well above 70 per cent. India's share of urban population at 19.9 per cent in 1971 is thus not only the lowest among countries included in the table but the increase from 11.2 per cent in 1921 to 19.9 per cent in 1971 is also the lowest.

12.3 Urban Growth Projections

12.3.1 Against the background of urbanisation growth in India and other countries of the world, we may examine projections made about urban growth in India by the end of this century. On the basis of present birth and death rates, India's population is estimated to reach a level of 1,032 m. in 2001 A.D. Taking into account the gradual lowering of birth rate from 30.4 to 25.7 and death rate falling from 17 to 10 per 1000 in 1971-2001 A.D., the medium projections give a population of 945 m. at the end of the century. This projected growth in population and its distribution are given in table 12.3.

Table 12.3

India's Population Trend (Medium)

(In millon)

Year	Total Population	Rural Population	Urban Population	%age Share of Urban	Percentage Growth 1971=100 Total	Rural	Urban
1	2	3	4	5	6	7	8
1971	548	439	109	19.9	-	-	-
1981	668	518	150	22.5	21.9	18.3	37.6
1991	801	596	205	25.6	46.2	36.1	88.1
2001	945	667	278	29.4	72.4	52.3	155.0

12.3.2 Urbanisation in India and its broad comparison with urbanisation rate in other countries clearly show that growth of urbanisation in the country has been quite modest. In our view, even the projected share of urban population at 29.4 per cent in 2001 A. D. cannot be termed as really alarming, although in absolute numbers this would add about 170 m. to our urban population.

12.3.3 The growth of population in metropolitan cities needs to be viewed in the context of expansion of city area. In Calcutta urban agglomeration the decennial percentage growth of population between 1961 and 1971 was only 22.57 while the area increased from 518.43 sq. kms. to 561.70 sq. kms. Similarly, in Delhi metropolitan area, the decennial growth of 54.57 per cent in 1961 to 1971 was accompanied by an increase in the area from 326.55 sq. kms. to 446.26 sq. kms. The area of Madras urban agglomeration more than doubled in 1961-71 while the decennial growth of population was 63.02 per cent. In fact, population in the core areas of some metropolitan cities has grown only marginally or might have even declined. Thus, expansion has mostly been in new colonies developed in peripheral areas.

12.3.4 Urbanisation is inextricably linked with the process of our economic growth. A certain minimum growth of urban population is,

therefore, unavoidable. The real issue to be tackled from the point of view of urban and land-use planning, including planning for urban transport, is how best to deploy new additions to urban population in new urban areas by providing appropriate opportunities of employment, housing and other civic facilities, so that they do not continue migrating into existing urban conglomerations and thus further worsening the standards of urban life. This calls for forward-looking and imaginative policies on urban and regional development, including a correct approach to land-use planning and industrial location which we recommend should be followed without loss of time to arrest further deterioration. We have not fully gone into these rather complex and difficult areas of urban planning but to comment upon some important aspects, which are relevant to urban transport policy.

12.3.5 While urbanisation rate in India has been quite modest, this does not reflect the impact of population growth in major centres on infrastructural facilities, including the transportation system. Population in major metropolitan cities has recorded a phenomenal growth and figures in absolute numbers are staggering. Concentration of immigration into a few selected cities is a matter of serious concern. Few new growth centres have come up since independence, and large cities have continued to attract population not only from rural areas but also from towns and small cities. Though in a number of major metropolitan cities, the physical area has increased over the years, the destinations in central business districts have remained unchanged, with the result that commutation in these areas has been very high. It is imperative that suitable measures are taken to ease this situation.

12.4 Optimum City Size

12.4.1 There has been much discussion on the optimum size of a city and on whether it is possible to identify this size and guide planners. Opinions have been expressed that the optimum city size is a myth and has no practical significance. We are of the view that while it is not possible to lay down in absolute terms what would be the optimum city size, this concept has some relevance. The op imality is a relative term which needs to be analysed in relation to investments made for building up the level of infrastructural facilities like water supply, sewerage and transportation facilities. It cannot be denied that availability of facilities and civic amenities does govern population. Thus, a city with a population of 20 lakhs might still prove to be optimum in size if infrastructural facilities have been provided to meet requirements of this population. On the other hand, a small city with a population of only 2 lakhs would not claim to have an optimum size if infrastructural facilities are too inadequate to meet demands of residents of the city.

12.5 Inter-action between Land-use and Transport Planning

12.5.1 In the last few decades metropolitan cities in India have experienced phenomenal expansion of population and economic activity. While business and economic activity has mainly been concentrated in central areas, residential colonies have spilled over into suburbs, thus greatly adding to intensity of commutation. Essentially urban transport problem arises because of separation of residence from work place. Enlargement of employment opportunities and relatively free choice of residence aggravate these problems. If it were somehow possible to establish proper linkages between the place of work and residence, commutation could be substantially curtailed. In practice, however, the average trip length tends to increase with growth of the city. When employment opportunities remain concentrated in central areas, trip lengths increase because residential accomodation keeps on spreading to the periphery which itself drifts further away from core as the city expands.

12.5.2 Dispersal of population and economic activity can be achieved in two possible ways. One is dispersal from central to outlying areas on the periphery, and the other from metropolitan city to the region. The former can be achieved by relocation of activity and development of district centres within metropolitan areas. But to achieve the latter objective a lasting solution is to develop rural areas and to create new centres of industrial activities away from existing metropolitan cities.

Land-use Planning as an Instrument of Urban Transport Policy

12.5.3 We have indicated limitations to land-use planning in restricting or reversing growth of

population in major urban centres but we are convinced that it is significant in the long run in planningof the transport system. Satellite towns are not completely isolated as they are well-connected with the "mother" city and function more or less as counter-magnets. Provision of adequate infrastructural facilities and dispersal of certain activities to satellite towns, together with a package of incentives and disincentives, will divert population and economic activities from central areas of metropolitan cities and influence transport requirements.

12.5.4 In this connection two factors have to be considered. First, optimal land-use planning is a long-drawn out and costly process, results of which are unlikely to be available for immediate relief to urban transport problems. This does not imply that attention should not be paid to restructuring of land-use planning; the point to emphasise is that while steps should be taken immediately their impact would be felt only after two decades or so. Secondly, dispersal of population and economic activity within a metropolitan area would lead to better distribution of trips and reduce congestion in central areas but in such a case total transportation repuirements of the area are likely to increase. This in turn calls for strengthening and expansion of transport facilities.

12.5.5 An important aspect requiring serious consideration is strict enforcement of rules and regulations formulated under the master plans which lay down development of land-use in the city over a number of years. Such plans are available for a number of cities in India, but they have not been properly implemented even in major metropolitan cities and many present transportation problems can be directly attributed to faiutre of land-use controls. Land-use planning and transport are closely linked and provision of transport facilities can give a new direction and shape to a city's future growth.

12.5.6 Land-use planning is particularly important for small and medium-size cities where fortunately the position is not irretrievable as in major metropolitan cities. It is essential that for all cities with a population of one lakh and above, proper master plans are drawn inter alia identifying transportaion requirements of the city. Once corridors have been indicated, land could be reserved, though construction work could be taken up in phases only when the stage of development demanded such facilities.

Limitations of Land-Use Planning

12.5.7 Views about the role of a big city vary. Some experts state that much greater emphasis should be laid on development of economic activity in the countryside by creating jobs and providing civic amenities. This alone would reduce pressure on urban centres by slowing down migration from rural areas, and diminish income and wealth disparities between urban and rural areas. Another school of thought, however, holds that growth of towns would alone solve problems of rural poverty. For it is argued that urban centres have potential for providing increasing employment, output and savings, thus creating possibilities for higher investment in towns and countryside in future. Concentration of economic activities in urban centres lays the basis for specialisation and higher productivity, as also for marketing of goods produced.

12.5.8 One of the many suggestions made in regard to problems posed by ever-increasing growth of major urban centres is development of "self-contained" or "satellite" towns isolated by green belts. Ebenezer Howard was the first to develop the concept of such towns in his book *Garden Cities of Tomorrow* brought out in 1898, which contemplated creation of planned, new self-contained and balanced communities with a population not exceeding 30,000 and city spread within a radius of one mile.* In practice, however, what Howard and his followers had expected did not materialise. As examples of attractive housing and site planning, Letchwoth and Welwyn in England were impressive, but after 40 years Letchworth has not yet grown to its planned size of 30,000 population, while Welwyn, for some of its families is a "dormitory suburb" of London, like Radburn and the greenbelt towns, have become and remain no more than "dormitories".

12.5.9 According to Hans Blumenfeld, in big cities people seek not merely a way of

*As quoted in The Modern Metropolis, by Hans Blumenfeld, published by the M.I.T. press in 1971.

living but of making a living. He says that there can be "no good living without making a living". People will leave green and pleasant fields and crowd into the city slums if that is where they can make a living. That has been happening ever since the beginning of industrial revolution.

12.5.10 The Soviet Union has had a similar experience and attempts to shift activities away from major urban centres have not proved successful. Holland Hunter* examines how efforts made in that country to restrict growth of major cities did not achieve the desired results. Pointing to some lessons other countries can draw from the Soviet experience, Holland Hunter states that decisive shifts in regional structure of economic activity are likely to take decades rather than years for accomplishment. According to him, powerful forces attract capital and labour to established centres which are likely to grow even if national policy seeks to prevent it.

12.5.11 Another element needs to be considered here. Earlier, we have stated that the rural share of population would increase from 439 m in 1971 to 667 m in 2001 A.D., recording an increase of about 230 m. If this additional population has to be kept in rural areas it will be necessary to create matching employment opportunities there. While major plan programmes have been undertaken for rural development, creation of productive job opportunities to 230 m additional people within rural areas cannot be taken as an easily attainable target. Further, assuming that this objective is somehow achieved, a situation in which flow of migration is reversed from major urban centres appears to be a near impossibility. This is not to deny that levels of earning, employment opportunities, living conditions, civic amenities and other services in urban areas, in spite of their being highly inadequate, are decidedly better than those in rural areas and are an inescapable attraction for rural population to move to cities. The city lights of a metropolitan city provide an added attraction. An average rural inhabitant is certainly much worse off than an average urban dweller and has perforce to look to urban areas for making a living

Transport for Decongestion of Metropolitan Cities

12.5.12 It is argued that lack of adequate transport and infra-structural facilities is one of the important factors accounting for the slow growth** of small and medium size towns It is therefore, proposed inter alia that transport facilities in smaller and medium size towns should be improved to attract migration to them, instead of to larger cities. We support this view and endorse the approach of the Draft Plan, 1978-83.

12.5.13 It is also proposed that new transport schemes for large cities could be drawn up, keeping in view the objective of decongesting metropolitan cities and containing or possibly reversing growth of population within a practical time-frame. The Working Group on Urban Transport, set up by us, has considered this issue in detail and has come to the conclusion that efforts could be made with good chances of success to restrict migration of population from rural areas and small towns to major metropolitan cities by promoting new growth centres and adopting a package of incentives and disincentives-incentives for moving out of big cities and disincentives for staying in or coming in to such cities. According to the Working Group, reversal of growth of population has, however, to be considered in the backgrouud of constitutional, economic and social considerations, in view of which achievement of zero or negative rate of population growth is neither feasible nor a desirable proposition. Containing population of a metropolitan city at the existing level and allowing for only natural growth would itself be a commendable achievement.

12.5.14 We have carefully considered the entire issue and, in our view, in so far as migration of people from villages and small cities to metropolitan cities is concerned, the single, most important, determining factor is availability of employment opportunities. So long as rural areas and small towns and cities do not offer enough employment opportunities to absorb working force of the region, job-seekers would continue to rush to major urban centres. There is little evidence to prove that transport facilities available in metropolitan cities by themselves provide a major attraction to migration from rural areas and small cities.

* Soviet Transport Experience—Its Lessons for other Countries by Holland Hunter, Published by the Brookings Institution in 1968.

** Revised Draft Five Year Plan 1978-83, Page 392.

As such, transport policy has only a limited role in restricting or reversing population growth in metropolitan cities. We are, therefore, convinced that restrictions on adequate intra-urban transport facilities in metropolitan cities would not achieve the desired objective of limiting or reversing population growth in these cities.

12.6 **Public Transport and Urban Transport Problems**

12.6.1 The phenomenal increase in population and economic activity in metropolitan cities has brought in its wake several social and economic problems. There is wide imbalance in spatial distribution of population and economic activities. This has necessitated large scale intra-city movement throwing up serious problems in movement of people, goods and vehicles.

12.6.2 Comprehensive traffic and transportation studies have been conducted for the four major metropolitan cities of Calcutta, Bombay, Delhi and Madras. We present some useful data on traffic volumes and share of trips by public transport and traffic projections for 1981 from these studies in table 12.4. Precise and systematic information regarding traffic levels for recent years in these cities is not available, but some broad and rough estimates have been included in it.

12.6.3 In Bombay and Delhi estimated trips in 1976-77 have already exceeded 1981 projections. This can be explained by two factors —one is growth rate of population and the other commuter habits or per capita trips per day. According to master plans population levels were expected to increase from 42 lakhs to 70 lakhs in Bombay and from 24 lakhs to 46 lakhs in Delhi in 1961-81. The actual growth of population has, however, been much faster. According to 1971 census, population figures of Bombay and Delhi were 60 lakhs and 36 lakhs respectively. Some broad estimates put the level of population in these two cities at 80 lakhs and more than 50 lakhs respectively in 1976.

12.6.4 The increase in trips is reflected in the number of motor vehicles, which has increased several-fold in metropolitan cities. Figures for the four major metropolitan cities, given in table 12.5, illustrate this. Together with increased usage and without corresponding increase in road space, the rapid growth in number of vehicles has resulted in severe congestion on roads, particularly during peak periods.

Table No. 12.4

Contribution of Mass Transport Trips in Total Travel in Metropolitan Cities

City	Total daily Trips (in lakhs)			Trips catered to by mass transport (in lakhs)		Percentage share of trips catered to by mass transport		Percentage distribution of mass Transport trips between Rail and Buses			
								Rail		Buses	
	66-67	76-77 (Est)	1981 (Proj)	66-67	76-77 (Est)	66-67	76-77 (Est)	66-67	76-77 (Est)	66-67	76-77 (Est)
1	2	3	4	5	6	7	8	9	10	11	12
Calcutta	35.0	70.0	76.0 (1983)	28.0	56.0	80	80	25	25.5	75.0*	745*
Bombay	46.0	94.0	63.5	39.0	70.0	85	75	55	53	45	47
Delhi	19.8	50.0	48.5	7.9	22.0	41	43.5	4	4	96	96
Madras	16.0	36.0	37.0	10.0	23.0	65	65	23	20	77	80

* including Trams (36 percent)

Source :
1. C. R. R. I. Report, 1971. Vol. XIV
2. Route Rationalisation Committee Report, Calcutta, 1976
3. Integrated Transportation Programme for MMA-1976-81—Working Group Report January-1977
4. Public Mass Transport System for Delhi—Working Group Report August, 1977
5. M.T.P.R.—Bombay—Survey Report of Bandra Kurla Rail Link—1978

Table No. 12.5

Growth of Motor Vehicles in Four Metropolitan Cities

Type of Registered Vehicles	Calcutta			Bombay			Delhi			Madras		
	1965	1971	1978	1961	1971	1978	1961	1971	1978	1961	1971	1978
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Car/Jeep/ Station Wagons	36,718	54,738	80,804	39,910	98,171	137,407	15,899	61,521	105,204	13,813	24,454	27,795
2. Motor Cycles/ Scooters (two wheelers)	5,727	15,589	33,917	6,576	32,555	62,687	14,325	109,112	282,338	4,809	14,243	40,765
3. Auto-rick-shaws (three wheelers)	-	-	-	12	6	667	3,410	10,812	17,890	-	393	1,518
4. Taxis	4,434	6,299	7,089	6,370	16,017	23,703	2,016	4,105	5,580	-	3,671	2,496
5. Buses(Standard/ School/Mini)	3,208	3,205	4,473	1,339	3,174	3,454	1,450	3,266	6,929	505	2,265	1,819
6. Trucks(Private/ Public/Carriers, Tractors/Trailers, Tempos/Delivery Vans)	11,797	20,655	25,792	13,433	27,492	35,496	3,952	15,262	31,112	2,328	3,471	5,378
TOTAL (1-6)	61,884	100,486	152,075	67,640	177,415	265,414	41,052	204,078	449,053	21,455	48,497	79,771

Source : State Authorities

12.6.5 With virtually no scope for widening roads the fast-growing traffic highlights the need for strengthening public transport in these cities. It is only through quick, efficient and economic public transport facilities that commuters can be diverted from using personalised modes of transport to public transport system, thereby reducing total number of vehicles plying on roads in central areas.

12.6.6 In small and medium size cities, cycles, cycle-rickshaws and tongas are the main modes of transport. There is no organised public transport system in these cities. Research studies sponsored by us have shown that the city bus service, though the cheapest mode of transport, forms an insignificant part of transport network, with the result that the main modes of transport in vogue are costly, and sometimes beyond the reach and paying capacity of ordinary citizens. The studies have also highlighted the need for introducing public transport bus system in these cities, particularly on high-density travel routes.

12.6.7 We hold the view that in the foreseeable future bus transport would continue to be the backbone of overall transport system for serving intra-city movements in most metropolitan cities. It is, therefore, essential that in these cities priority is given to strengthening and optimisation of bus services. There may not be much scope for further optimisation of bus services in Bombay, but bus operations in Calcutta, Delhi, Madras and other large cities could definitely be optimised by improving physical performance, management standards, financial achievements, and better utilisation of road capacity through traffic management measures. In the case of medium size cities, provision of more buses and rationalised operation of bus services is called for.

12.6.8 In view of acute oil situation in the country, we would like to draw special attention to the need for strengthening public mass transport system and ensuring its efficient operation. In our opinion, conservation and optimal utilisation of oil resources deserves priority. We, therefore, recommend that a deliberate policy with specific measures should be adopted to encourage diversion of traffic from personalised modes of motor transport to public transport system. Further, emphasis should be laid on the provision of electric traction based public transport system—the most important consideration being energy conservation.

12.7 Options for solving Urban Transport Problems

12.7.1 *Metropolitan Rail Transport System :* A common conclusion reached through comprehensive traffic studies is that traffic density in metropolitan cities is beyond the capacity of any road-based transport system. These studies established the need for providing high capacity rapid transit (grade separated lines where other modes of transport do not interfere in its movement) rail facilities and, accordingly, identified suitable rail corridors. The Metropolitan Transport Project (Railways) Organisations conducted techno-economic feasibility studies for rapid transit system (R.T.S.) networks and worked out financial investments required for implementing these projects in the four metropolitan cities. The R.T.S. network, as recommended in techno-economic feasibility studies for metropolitan cities of Calcutta, Bombay, Delhi and Madras, are given an annexure 12.III. In view of the magnitude of financial outlay involved and relative plan priorities, it was not found possible to undertake these projects, except one scheme in Calcutta.

12.7.2 During our visits to the States, we held discussions with State Government agencies, railway authorities and representatives of public on urban transportation problems. We were informed that the volume of commuter traffic in these cities was mounting up daily aud the existing public transport facilities were operating under severe strain. The levels of overcrowding were becoming almost unbearable and even maintaining the level of existing transport facilities was posing great difficulties. The State Governments, railway organisations and user interests stressed the need for urgent implementation of certain low-cost surface rail transport facilities.

Calcutta

12.7.3 Construction of a rapid transit line from Dum Dum Junction to Tollyganj, about 17 kms in length and estimated to cost Rs. 250 crores is in progress. The total likely expenditure up to 1978-79 is approximately Rs. 45 crores. The first phase of the project, from Dum Dum to Shyam Bazar and Tollyganj to Esplanade, is scheduled to be opened in 1984, and the second

phase from Shyam Bazar to Esplanade in 1986. This rapid transit line is expected to carry 13.2 lakh passengers per day in 1986 and 17.2 lakh passengers per day in 1990.

12.7.4 The State Government authorities reffered to a proposal for construction of a circular railway to meet increasing commuter traffic in the city. The proposal is in a preliminary stage and a cost-benefit analysis has not yet been conducted. We, therefore, could not take a view on the merits of the scheme.

Bombay

12.7.5 In Bombay some works on optimisation of the Harbour Branch line and construction of a rail fly-over at Bandra to enable direct running of trains from north of Bandra on the western railway to Victoria Terminus on the central railway, have been sanctioned and work is in progress. The following schemes were suggested to us, for early implementation :

(i) Optimisation of western and central railway sub-urban services.	Work envisaged in several phases.
(ii) Fly over at Raoli junction and a pair of additional lines between Bandra and Andheri along with ancillary works on the Harbour Branch.	Estimated cost Rs. 25 crores.
(iii) East West corridor (Bandra-Kurla-Mankhurd--Belapur-Panvel).	Survey in progress.

12.7.6 We are of the view that the East-West corridor connecting the suburbs of Bombay with New Bombay should receive the highest priority as this, in our judgement, will help disperse commercial and industrial activities away from south Bombay and also facilitate development of New Bombay. The provision of a rail flyover at Raoli junction and additional pair of lines between Bandra and Andheri, together with ancillary works on the Harbour Branch line, will also be necessary as this would provide substantial relief on the already congested western and central railway suburban systems. The exact phasing and relative priority of the three schemes mentioned above may be determined, keeping in view availability of funds and optimisation of land-use for Bombay region.

Delhi

12.7.7 A Parikrama rail service (Ring Railway) was introduced in Delhi in 1975 covering a distance of 36 kms. The service provided is nominal as there are only four trains each way daily. It caters to about 6000 passengers per day. The following schemes were put forward :

(i) Intra-urban ring railway with spurs to Shakurbasti and Tughlakabad.	Estimated cost Rs. 22 crores.
(ii) Inter-urban rail links (Delhi-Ghaziabad, New Delhi-Ballabgarh, and Delhi-Sonepat).	Estimated cost Rs. 31.55 crores.

12.7.8 Delhi metropolitan area is presently being served almost entirely by public bus transport system. We hold the view that these services will soon have to be supplemented by surface rail transport facilities. It is significant that Electrical Multiple Unit (EMU) suburban services were introduced in Bombay as far back as 1928, while in Madras and Calcutta these were introduced in 1931 and 1957 respectively. In those years population of Bombay was less than a million and of Madras less than 7 lakhs. It hardly needs to be emphasised that the city bus service alone cannot adequately meet the traffic requirements of a population of over 50 lakhs in the Delhi metropolitan area. We recommend that the proposal for intra-urban ring railway scheme should be given serious consideration immediately to relieve pressure on bus transport. In due course depending on the resource position, item (ii) above will also have to be examined.

Madras

12.7.9 The Madras Beach to Tambaram metre gauge section which provides EMU services carries bulk of the commuter traffic. The following schemes were put forward for meeting the growing commuter traffic.

(i)	Optimisation of MG line Beach-Guindy	Estimated cost Rs. 11.81 crores
(ii)	Beach-Bharati Salai line (first phase of R.T.S.)	Estimated cost Rs. 23.84 crores
(iii)	Conversion of small stretch of MG line into mixed gauge.	Estimated cost Rs. 0.37 crores

12.7.10 The optimisation of MG railway line from Beach to Guindy should in our judgement be given priority. The construction of a new railway line from Beach to Bharati Salai or any other terminal which may be considered appropriate on traffic considerations will also require to be taken up soon although this scheme can be phased over a longer period depending on availabliity of funds.

Surface Electrified Rail Facilities in other Metropolitan Cities

12.7.11. We hold the view that the possibility of supplementing the city bus transport services by suitable surface electrified rail facilities should be explored soon for other metropolitan cities like Hyderabad, Ahmedabad, Kanpur, Bangalore and Pune. This will be essential not only with a view to meeting increasing pressure of passenger traffic demand on urban transport system in these cities but also in the interest of conserving oil resources. This mode of transport has added advantages of being pollution-free, less prone to accidents and capable of providing speedier movement.

Role of Intermediate Public Transport (IPT)

12.7.12 Intermediate transport modes like mini-buses, taxis, motor cycle and scooter-rickshaws, cycle-rickshaws and tongas, falling in the category between private modes and conventional bus transport, also fulfil travel requirements of urban areas of different sizes. The growth of IPT modes in certain selected cities in 1972-77 is shown in annexure 12.IV.

12.7.13 The substantial growth in IPT modes indicates, on the one hand, the inadequacy of public transport facilities in these cities and, on the other, the need for door-to-door and journey-at-will service for the less affluent who do not possess private vehicles. It also reflects the inherited road system of urban settlements where larger and faster moving vehicles cannot operate. The supply of IPT modes varies considerably from one settlement to another situated in different parts of the country. While small and medium size towns in the northern India have a preponderance of cycle rickshaws, auto-rickshaws predominate in cities in the south. For example, Meerut and Faridabad had 8717 and 3276 cycle rickshaws respectively in 1977, and no auto-rickshaws. The dominant modes of IPT in Aurangabad were auto-rickshaws (470 in number in 1978) and, to a much lesser extent, tongas (84 in 1978). There were no cycle rickshaws and available taxis were operated exclusively for inter-city travel, mostly catering to tourist traffic.

12.7.14 The School of Planning and Architecture, New Delhi, conducted at our instance a study on intermediate public transport covering three cities, namely, Delhi, Meerut and Faridabad. One of the main observations made in this study is that the community in medium size cities has to depend heavily on IPT modes like cycle-rickshaws, tongas and auto-rickshaws which have been introduced and have increased along with growth of the town. In the absence of choice of modes, passengers in medium size cities have not been able to take advantage of shorter distance of travel from compactness and smaller size of settlements. The average cost of travel per passenger km in medium size cities is four to five times the travel cost in metropolitan cities due to lack of organised mass transportation system. The choice of modes for travel is essentially dependent on the nature and purpose of the journey to be performed. Irrespective of the efficiency of public transport, it can cater only to fixed time and route journeys. Low vehicle ownership necessarily means that requirements of door-to door and journey-at-will facility has to be met by hired vehicles, which have the flexibility of routing, scheduling and luggage carrying capacity.

12.7.15 The study attempted to assess demand for cycle rickshaws and auto-rickshaws for future years for urban settlements with population ranging from one lakh to five lakhs, five lakhs to one million, and above one million. According to the study, cycle rickshaws demand is estimated to increase from 1.3 million to 2.2 million, an increase of 70 per cent, and that of auto-rickshaw demand from 1 lakh to 2.7 lakhs, an increase of 160 per cent between 1979 and 2001 A.D. The study has concluded that medium

and small size towns will continue to have cycle rickshaws as a predominant IPT mode.

12.7.16 IPT modes are undoubtedly important in urban transport system and their services would continue to be needed, though in different forms and degrees, depending on sizes of urban centres. Variations in income levels of citizens, differences in valuation of time and comfort, variations in physical patterns and structure of roads, purpose of journey and traffic density will make it imperative for IPT modes to continue to be useful in urban transport system.

12.7.17 IPT should also be singled out on employment grounds, as it provides job opportunities for weaker sections of the society. Considerable employment potential is created not only in operation of IPT but also in manufacturing and ancillary industries related to it. According to the study mentioned in the preceding paragraphs, dependents in this sector, inclusive of ancillary and service industries, are estimated at about 300,000 in Delhi, 90,000 in Meerut and 38,000 in Faridabad, constituting 6 per cent, 18 per cent and 19 percent of total population of the three cities respectively.

12.7.18 For various reasons, including shortage of funds to provide organised public transport system, we think that IPT modes will be important in urban areas as a supplementary system to public transport. We have no doubt that this point will be appreciated by transport planning authorities. To promote growth of this mode on social and efficient lines, we recommend that increasing attention should be paid to provide adequate facilities for institutional finance, improvement in design of vehicles and greater safety and comfort for passengers as well as operators. In major urban centres as well, intermediate public transport system is important for certain types of commuters and purposes of travel, for example, visits to hospitals and dispensaries, railway stations and religious or cultural centres In major metropolitan cities, however, intermediate public transport will have to be considered with reference to particular mode and its suitability for the city. For example, taxis, particularly shared taxis, are useful in these cities but auto-rickshaws could be a traffic hazard and may at best provide limited service under controlled conditions. We would like to emphasise need for research and development to avoid or reduce noise and air pollution and safety hazards in IPT modes.

Role of Trams and Trolley Buses

12.7.19 Presently tram services are operating only in Calcutta, as these services were withdrawn from other cities few years ago. Calcutta Tramway Co., has 438 tramcars, out of which 300 are being outshedded daily. About 6.8 lakh passengers use tram system everyday on the 26 routes spread in the city. As trams have their reserved right-of-way they are able to provide a quicker and cheaper service for intra-urban commuters. In our view trams are rendering a useful service in Calcutta. Trams use electric power for traction and do not depend on fuel oil. They are, therefore, important in urban transport from energy point of view. Efforts are called for to modernise and strengthen these services which could be gainfully extended to newly developing suburbs of Calcutta wherever enough road capacity is available to provide them with a reserved right-of-way.

12.7.20 In recent years, interest is shown in electric trolley buses on energy consideration to serve traffic requirements of metropolitan cities. Earlier an experiment with operation of trolley buses was made in Calcutta but it was not found successful. However, we attach importance to trolley buses on energy considerations, especially in those cities where commuter service cannot be provided without substantial capital investment and, therefore, urge that potential for this mode should be fully explored in an integrated urban transport system. We understand from such evidence as is available that compartive cost economics is decisively in favour of trolley buses vis-a-vis dieselised buses, and we see no justification why they should not be inducted in the transport system of at least metropolitan cities in the country.

Need for Urban Transport Organisation at the Centre

12.7.21 Emphasising the need for comprehensive traffic surveys for metropolitan cities, the Working Group on Urban Transport observed that with the winding up of Metropolitan Transport Team of the Planning Commission in 1974, there is no unified single agency at the national level to

provide technical guidance for conducting such surveys. It has recommended that a permanent central cell, consisting of multi-disciplinary experts, should be set up in the Planning Commission or in a suitable Ministry to study urban transportation problems in various urban centres within a framework of an integrated approach for providing required transport facilities. We endorse the view of the Group and recommend that a suitable organisation should be established at the Centre, preferably as part of the National Transport Commission, to supervise and monitor traffic-cum-land-use studies for cities and also provide technical know-how and expertise to local planning bodies of State Governments in this area.

12.8 **Problems of Medium-size cities**

12.8.1 For medium size cities with a population of 1 lakh to 5 lakhs and larger cities with a population of 5-10 lakhs no comprehensive traffic and transporation studies have been made. It is, therefore, not possible to discuss transportation problems of urban centres in any precise manner. It may, however, be stated that generally problems of these cities are similar in nature to that of major metropolitan cities. In a way these cities are placed in a worse situation because at present no attention whatsoever is being paid to even identifying their transportation problems and conditions are fast deteriorating day by day. Whatever infra-structural development is made, it is haphazard, ad hoc and unrelated to traffic requirements assessed on any scientific basis.

12.8.2 In view of lack of information on medium size cities we had commissioned studies to study transport problems of selected number of cities. The salient features of transport situation in medium size cities brought out by these studies and steps to be taken for meeting their traffic requirements are described here. Some findings are very revealing.

12.8.3 The study by the Central Institute of Road Transport, Pune, states that what separates larger cities from medium size urban areas is total lack of appreciation that the latter are nearer to cities than to villages in regard to their problems and frustrations. While problems faced by larger cities are at least taken note of, those of larger towns are yet to be voiced, recorded and remedied. Development of medium size urban areas is haphazard, tentative and as yet devoid of any comprehensive planning which would look into future with confidence. It is necessary to take note of their problems before they grow into large cities and pose problems similar to them. The report further says that distances in large towns are too long to be traversed by walking. Intermediate public transport such as tonga, cycle rickshaw or auto-rickshaw, is beyond the reach cost-wise for regular twice-a-day commutation between places of residence and work. The cities bus transport, though cheap, suffers, from inadequacy and inefficiency due to lack of sincere effort both by operators and authorities. The study indicates that city bus is a mode preferred next only to walking and cycling and as urbanisation catches on, increased distances will cause considerable modal shift to city buses. But city bus operation is presently an unwanted activity because of its unprofitability. From overall development point of view, city bus operation deserves greater attention.

12.8.4 According to CIRT Report, there is an absence of integrated approach to inter modal co-ordination between total transportation needs and comprehensive transport planning, combining activities of land-use planning and road management. To face the challenge of future with confidence it is essential to bring all these activities under a single authority, responsible to a single body.

12.8.5 In the findings of the study by the School of Planning and Architecture, priority is sought to be given to development of organised bus service in medium size cities to reduce travel cost and increase mobility. Bus transport facilities also needed to be developed and strengthened in medium size cities, particularly on high-density travel routes, while intermediate public transport system would continue to occupy a .significant block in medium size cities. It is, therefore, essential to improve IPT services by R & D effort to make these modes safer and more efficient through a liberal policy for extending institutional finance and other supportive social and economic measures to them.

12.8.6 The report of Khosla Consultants has highlighted lack of bus services in medium size

cities. The report states that while a high percentage of cycle rickshaws and auto-rickshaws are used for social purposes, satisfaction levels are low and people are compelled to use these expensive means of transportation in the absence of alternative cheaper means like a bus.

12.8.7 The Indian Institute of Management, Ahmedabad, has in its report observed that the most critical problems in medium size cities are inadequate, poorly designed and outdated road systems and overcrowded transport facilities. Due to intense and unplanned land-use and rapid growth of hetrogenous traffic in limited road space, traffic and transportation problems, in these cities are reaching a climax. Absence of a well-organised public transport system has led to concentration of private modes of transport, including cars, scooters, motor cycles and multitude of hired modes, such as, cycle rickshaws, auto-rickshaws and tempos. The study has recommended stricter application of traffic laws, coupled with driver education schemes, elimination of cycle rickshaws and restriction on use of auto-rickshaws, provision of separate cycle-tracks and sidewalks, and zebra-crossing for pedestrians. It has also emphasised need for comprehensive traffic and transportation studies for these cities.

12.8.8 For medium and small size cities we would like to recommend bus services on a selective basis and on routes of high density of travel. For short-distance, low-density, door-to-door and journey-at-will trips, intermediate public transport modes should play a predominant role. It would, however, be necessary to optimise operations of IPT modes and improve design of vehicles. As no precise or systematic data are available to indicate traffic demand, nature and pattern of commuter movement, supply of transport facilities, their adequacy or otherwise, and future pattern of growth in small and medium cities, we strongly recommend that proper traffic cells should be set up in the States for conducting traffic surveys on a regular basis for cities with a population of one lakh and above. These traffic cells should identify transportation problems in these cities and suggest suitable remedial measures from time to time.

12.9 Regulation and Control of Urban Traffic

12.9.1 As financial constraints impose a limit on the extent to which capital intensive transport projects can be taken up and also as restructuring of land-use pattern is a long-term solution, the one method which, in our view, can substantially improve travel situation in cities, without major investment, is rationalising use of road space through traffic management and control. In our view, expenditure of public money on strengthening road network will not alone meet the pressure of traffic demand in metropolitan areas unless such investments are supplemented by adequate and effective traffic management measures, physical as well as fiscal.

12.9.2 In the context of conditions prevailing in Indian cities, physical control measures like traffic engineering and priorities, general physical restraints and staggered working hours, are important in substantially stepping up traffic-carrying capacity of roads and improving travel situation in metropolitan cities. These measures have, however not been given due attention so far. Road space which by itself has an exceptionally low share of the city area is not available to traffic because of encroachments, unauthorised land-use, inefficient traffic engineering methods and disorganised plying of vehicles. We recommend that improved traffic management methods should be given priority. Proper traffic cells should be organised for carefully studying traffic problems on all arterial roads, major inter-sections, level crossings and terminals, and for adoption of suitable remedial measures.

Bus Priority Schemes

12.9.3 The need to strengthen public transport system, particularly in metropolitan cities, has been discussed in earlier paragraphs. Presently buses suffer most on account of congestion in central areas and steep reduction in their speeds, which not only increases journey time but also raises operation cost through higher fuel consumption and greater wear and tear of the vehicle. With specified road space for buses, severe road congestion can be reduced only by diverting maximum possible traffic from personalised modes to public transport system. The need for such diversion has now assumed importance on energy considerations. If bus services have to provide a quick, convenient and economic service, these have to be given preferential treatment. Measures for improvement would include reserved bus lanes in highly

congested areas, priorities at inter-sections and access points, and good terminal facilities to improve turn-round time.

12.9.4 Reserved bus lanes have been provided in most larger towns and cities in Great Britain. The 'with flow' bus lanes are more common and allow buses to bypass queues of vehicles, particularly on approaches to self-controlled junctions. Sometimes reserved bus lanes are operational only in peak periods of congestion so that these do not create traffic management problems at other times. In 'contra-flow' bus lanes, buses travel against main traffic flow and are often saved of long detours caused by one-way traffic restrictions. Studies in Britain have shown that, in general, bus lanes have cut bus journey time, and that benefits to bus passengers have outweighed costs of delays to cars and other traffic.

12.9.5 In India, only limited experiments have so far been made regarding reserved bus lanes. The so called 'with-flow' bus lanes introduced in Delhi have not been fruitful mainly because these were not properly planned. The bus-lanes assume a particular density of bus traffic which was not there. Secondly, there were too many intersections and, finally, lane rules were not enforced properly. The 'contra-flow' bus lanes introduced in Bombay are, however, understood to have been a success. Well formulated plans of reserved bus lanes are expected to facilitate bus mobility substantially.

Pedestrian Precincts

12.9.6 Pedestrians are perhaps the most neglected category of people moving on roadsin Indian cities. Very few roads provide for a side-walk or a footpath for use of pedestrians. Even where these have been provided, they are not useable mostly because of encroachments. In many cases they are very poorly maintained and have no lights. Generally zebra-crossings have not been provided on busy roads or are hardly used.

12. 9.7 In a number of large cities abroad, new shopping precincts have been specially designed for pedestrians with exclusion of motor traffic. Main shopping streets in town centres have been converted wholly or partly to pedestrian use. In these areas, vehicular traffic is entirely banned. The only vehicles allowed into core areas are delivery vans, limited to a certain period of the day. We recommend that, based on systematic studies, certain areas should be reserved for pedestrians only while in other cases suitable footpaths with proper lights and zebra-crossings or subways should be provided.

Special Facilities for Cyclists

12.9.8 A large part of population in Indian cities is dependent on use of cycles. Most trips, including work trips are made on cycles. In Delhi the number of cycles is estimated at between eight to ten lakhs. But little has been done to provide a safe and convenient ride to cyclists. Generally, cycle tracks are conspicuous by their absence. This results in hazards to mechanised vehicular traffic and a risk to the life of cyclists. Wherever these tracks have been provided, they are ill-designed, poorly sited and badly maintained. The obvious result is that neither cyclists care to use them nor traffic police enforces adherence to use of tracks. Provision of proper cycle tracks on city roads and exclusive cycle tracks where traffic density is high, merit serious consideration. Suitable tracks should also be developed for safe and convenient movement of cycles which can usefully cater to intra-city short-distance commuter trips. In view of oil crisis cycle assumes greater importance. Efforts to improve the design of cycle are also called for.

12.9.9 In many cases traffic management measures adopted so far are heavily biased in favour of motor cars. We recommend that the basic approach needs to be changed and priorty given to movement of pedestrians, cyclists and public bus transport system.

Parking Areas

12.9.10 Hardly any attention has so far been paid to development of proper parking areas. Auto-free zones and pedestrian precincts presuppose availablity of adequate space for parking vehicles at appropriate places. Some traffic management measures are closely interlinked and need to be adopted in a co-ordinated manner to achieve success. Parking areas should also be provided and steps taken to enforce their use.

Truck Terminals

12.9.11 A large number of trucks ply in central areas for collection or delivery of consignments. Many of these trucks are parked on roadsides till the next journey. Such idle parking occupies valuable road space and creates serious traffic problems. In some cities attempts have been made to develop 'transport or auto-nagars'(centres) which provide space not only for parking but also facilities for repairs, godowns booking offices and amenities for drivers and attendants. We are of the view that such 'transport nagars' should be developed in major urban centres and, if properly organised, they would be welcomed by operators and users in the long run if there is some resistance to them in initial stages.

Staggering of Working Hours

12.9.12 Staggering of working hours can ensure better distribution of trips, thereby reducing congestion on roads and overcrowding on public transport system during peak hours. Unfortunately, this scheme has not been given adequate consideration. Some half-baked and unplanned attempts have been made which obviously proved unsuccessful. For example, the present staggering of working hours in Government offices in Delhi by 45 minutes is not long enough to achieve optimal utilisation of bus fleet.

Five-day Week a measure to save Transport Effort

12.9.13 A suggestion has been given to us that a system of five-day week by suitably adjusting working hours will significantly help in energy conservation. It will also lead to better utilisation and maintenance of city bus fleet. The advantages of this system, however, need to be studied.

Traffic Management in Small & Medium cities

12.9.14 In most cities other than the four major metropolitan ones, scientific traffic management measures are almost non-existent. A large number of unlicenced vehicles ply on roads and encroachments reduce road width to nearly half. The slowest and fastest vehicles share the same carriageway, severely hampering mobility. There is also hardly any attempt by authorities to identify bottlenecks. We recommend that traffic management measures should be promoted in medium and small size cities as well.

Pricing Policy

12.9.15 Apart from physical controls, various pricing methods have been suggested for controlling traffic in urban areas. These include daily or supplementary licencing, toll charge, metering for use of roads and parking fees. Some of these measures are found to be operationally difficult to apply. The system of daily licences provides for special permits, issued on prescribed charges, enabling vehicles to enter or circulate within a congested central area. Such a scheme has been introduced recently in Singapore. Entry charges can be regarded as a variation of daily licence system. Such charges can be levied at entry points to congested areas. Road pricing through metres is a sophisticated computerised system designed to charge directly for road use, whether congested or not.

12.9.16 In our view there is a need for introducing some measure of pricing to restrict traffic in our larger cities. Operationally one of the most successful measures is to charge a fee for parking in congested city centres. Parking charges can be fixed to reflect economic cost of space, use. The parking problem has become acute in metropolitan cities in recent years. In the absence of any systematic provision for parking space, congestion due to parked vehicles adversely affects mobility on main roads of these cities.

Road Accidents

12.9.17 Accidents are largely caused by faults of drivers, users, roads and vehicles. It is recommended that training from regcognised organisations like the industrial training institutes should be mandatory before issue of driving licence and those holding diplomas from such institutes need not undergo further tests. Necessary improvements should also be made in enforcing traffic rules and regulations more effectively. Proper traffic education and publicity through advertisements, radio and TV wherever available, will generate consciousness of traffic rules and regulations.

Research & Development

12.9.18 Traffic management measures are mostly adopted in a routine style and there is no system for taking into account the changes in circumstances or new innovations elsewhere. In Great Britain, the Transport and Road Research Laboratory (TRRL) furnishes technical and scientific advice and information, based on research in highway engineering and structures, traffic engineering and safety, and transport operations and system. There is need for setting up a snitable agency in India to conduct necessary research studies on these aspects on a regular basis.

12.10 Fares and Subsidies

12.10.1 The problems of transport pricing and subsidies have been discussed earlier.* The guidelines outlined there will be equally applicable to urban transport. We have also stated our approach to suburban rail fares. In the present context, we briefly review the performance of main city bus undertakings in the country.

12.10.2 Table 12.6 shows performance indicators of major city bus undertakings. In the case of Delhi Transport Corporation (DTC) losses are the highest but the fare is also the lowest at 3.00 paise per km. It is correct that city transport services almost everywhere incur losses in operation, because of the peculiar nature of urban travel demand which is concentrated in peak period and in many cases uni-directional in character. Fleet utilisation, vehicle utilisation and bus staff ratio are, however, good indicators of standards of physical performance and management of the undertakings. The point being emphasised is that losses are also attributable to fare levels which are deliberately kept low and do not reflect increases in operational costs. This in our view is not justified.

Table 12.6

Performance Indicators of City Bus Undertakings

Bus Undertaking and year		Average Fleet Strength (Year-end in number)	Fleet utilisation (in%)	Vehicle utilisation (kms per bus per day)	Bus staff Ratio	Operating cost (paise per km)	Revenue earnings (paise per km)	Average Fare level (paise per km)	Losses (Rs. crores)
1		2	3	4	5	6	7	8	9
C.S.T.C Calcutta	1973-74	1363	40.6	137	18.8	436	176	4.00	7.38
	1975-76	1331	40.4	141	16.8	570	222	4.68	9.98
	1977-78	1178	48.7	139	N.A.	N.A.	N.A.	5.00	12.95
B.E.S.T. Bombay	1973-74	1478	91.0	218	9.2	236	201	4.25	2.61
	1975-76	1639	91.0	217	11.3	329	286	5.28	3.35
	1977-78	1817	93.0	222	14.3	362	321	6.67	5.19
D.T.C. Delhi	1973-74	1494	70.9	179	** 12.9	** 220	** 127	3.00	6.52
	1975-76	2131	71.2	222	11.3	263	139	3.00	13.36
	1977-78	2195	73.2	228	11.1	279	159	3.00	16.17
P.T.C. Madras	1973-74	1050	87.3	224	11.9	158	150	N.A.	1.21
	1975-76	1321	87.7	217	9.1	214	181	4.02	4.90
	1977-78	1491	86.8	217	9.1	220	223	5.20	0.25

*See Chapter 4.

** Includes the staff and their cost etc. provided to private buses operating under D.T.C.

Source : Reports of the Central Institute of Road Transport, Pune—Performances of Nationalised Road Tranport Undertakings & Annual Reports of city transport corporations.

12.11 Single Transport Authority

12.11.1 Earlier, we have discussed the need for proper co-ordination of different transport services*. Machinery for co-ordination and organisational arrangements have also been suggested. Here, we briefly refer to need for a single transport authority for handling urban transport.

12.11.2 An unsatisfactory aspect of city transportation today is absence of any single co-ordinated transport authority for planning and administration of transport policies. Many key transportation functions are the responsibility of local bodies, which do not have adequate administrative, physical or technical resources to deal with problems before them. Separate units of the Government are responsible for providing transportation facilities in urban areas. Traffic and transportation system is made up of separate and well-defined segments, such as, roads, bridges, tunnels, railways, road transport, inland waterways and traffic management. These facilities, built on a piece-meal basis over a period of time, have been largely constructed to serve only a part of total transportation needs, and have hardly any relationship to functioning of other components. There is also absence of co-ordination between them. To quote an instance, roads constructed by one authority are excavated soon after by another for laying a cable or repairing a pipeline and in many cases subsequent restoration and resurfacing are seldom adequate or satisfactory. Moreover, complicated and time-consuming negotiations between various agencies tend to be necessary before any agreed project is brought to reality. This results in an extremely fragmentary approach to traffic and transportation problems in urban areas

12.11.3 In our view, what is really necessary in any city area, which has been overlooked in the past, is need for developing an effective total transportation network. This is possible if there is a co-ordinating agency or a single transportation authority, capable of planning, implementing and administering an efficient transport system. The first important function of such an overall authority has to be a comprehensive appraisal of existing travel facilities and identification of their shortcomings from the viewpoint of an overall transport network. It would then be necessary to develop a 'systems approach' to urban transportation problems so that total transportation plan and overall system it provides makes the network much more productive than the sum of its separate parts.

12.11.4 We recommend that single transport authorities may be set up as part of the regional development authorities like Calcutta Metropolitan Development Authority (CMDA), Bombay Metropolitan Region Development Authority (BMRDA), Delhi Development Autority (DDA), and Madras Metropolitan Development Authority (MMDA). These authorities should be in overall charge of all modes of transport operating city services, including metropolitan rapid rail transit systems, and matters connected with them like determination of fare structure, subsidies, traffic management measures, traffic singals, and parking areas. At operational level these regional authorities could appoint separate boards for separate modes or activities.

12.12 Summing Up

12.12.1 The rate of urbanisation in the country has been modest, though concentration of migration of people to a few selected major metropolitan cities is a matter of concern. This migration is essentially in search of employment opportunities and a lasting solution to the problem, therefore, lies in promotion of employment opportunities in villages and small towns, new growth centres and regional development.

12.12.2 Land-use policy is important in decentralising population but its impact is a long-term one and it does not provide immediate relief to the transportation problems in major urban centres. While immediate action on restructuring land-use pattern is necessary, simultaneously the existing transport facilities must be augmented and expanded. This is essential even to meet the present level of traffic demand in metropotitan cities.

* See Chapter 6.

12.12.3 In metropolitan cities emphasis has to be laid on strengthening and developing surface electrified rail services which not only provide high capacity transit but substantially help in energy conservation besides many other advantages. Such facilities should be considered for other large cities also where traffic density justifies this form of transport.

12.12.4 The transportation problems of medium and small size cities call for urgent attention. Intermediate public transport modes would continue to be the predominant mode of transport in these cities but bus services need to be introduced on high density travel routes.

Annexure 12.1

Growth of Population in Urban Agglomerations and Towns

Class of Urban Agglomeration/Town and Population	No. of Urban Agglomerations Towns	Census Year	Population (in lakhs)	Percentage decade variation
1	2	3	4	5
Class I (1 lakh and above)				
(i) 30 lakh & above		1941	68.91	
		1951	105.35	+52.88
		1961	141.93	+34.72
	4	1971	198.19	+39.64
(ii) 10—30 lakhs		1941	25.52	
		1951	40.94	+60.42
		1961	54.17	+32.32
	5	1971	76.02	+40.34
(iii) 5—10 lakhs		1941	25.25	
		1951	35.76	+41.62
		1961	48.87	+36.66
	10	1971	66.79	+36.67
(iv) 3—5 lakhs		1941	36.69	
		1951	50.25	+36.96
		1961	68.38	+36.08
		1971	100.35	+46.75
(v) 1—3 lakhs	25	1941	10.93	
		1951	42.29	+296.07
		1961	86.81	+100.53
	104	1971	167.76	+ 93.25
Total Class I		1941	167.30	
		1951	275.59	+64.73
		1961	400.16	+45.20
	148	1971	609.11	+52.22
Class II (50,000 to 99,999)		1941	50.29	
		1951	62.14	+23.56
		1961	84.95	+36.70
	183	1971	123.45	+45.32
Class III 20,000 to 49,999)		1941	72.49	
		1951	99.17	+36.81
		1961	137.83	+38.98
	582	1971	178.03	+29.18

Annexure 12.1 (*contd.*)

1	2	3	4	5
Class IV		1941	70.18	
(10,000 to 19,999)		1951	86.54	+23.31
		1961	122.76	+18.74
	874	1971	123.48	+20.16
Class V		1941	66.49	
(5,000 to 9,999)		1951	80.09	+21.95
		1961	56.36	−30.50
	678	1971	51.52	− 8.77
Class VI		1941	14.78	
(less than 5000)		1951	19.78	+33.83
		1961	7.31	−63.02
	178	1971	5.64	−22.85
All classes		1941	441.53	
		1951	624.44	+41.42
		1961	789.37	+26.41
	2643	1971	1,091.14	+38.32

Source : Census of India 1971—Series, I, Part II-A(i)

Percentage Share of Urban Population in Selected Countries

Country	1920-21	1930-31	1949-41	1950-51	1960-61	1970-71
1	2	3	4	5	6	7
Australia	N.A.	64.0 (1933)	68.9 (1947)	78.9 (1954)	81.9	85.6
Israel	N.A.	N.A,	N.A.	71.7	77.9	82.1
New Zealand	53.9	56.4 (1926)	56.8 (1936)	55.2	55.2 (1959)	81.4
U,K.	79.3	80.0	N.A.	80.8	80.0	78.0
Canada	49.5	53.7	54.3	62.9	69.6	76.1
Chile	46.4	49.4	52.4	59.9	67.2	76.0
Germany (W)	N.A.	N.A.	70.5 (1939)	71.1	76.8	73.6
U.S.A.	51.2	56.2	56.5	64.0	69.9	73.5
Japan	18.1	24.1	37.9	37.5	63.5	72.1
France	46.4	51.2	53.0 (1946)	55.9 (1954)	N.A.	70.0 (1968)
Iraqt	N.A.	N.A.	N.A.	33.8 (1947)	39.2	59.0
Mexico	N.A.	33.5	35.1	42.6	50.7	58.7
USSR	N.A.	17.9 (1926)	31.7 (1939)	N.A.	47.9 (1959)	56.3
Brazil	N.A.	N.A.	31.2	36.2	45.1	55.9
Peru	N.A.	N.A.	35.4	43.6 (1956)	47.1	53.2
Egypt	N.A.	N,A.	25.1 (1937)	30.1 (1947)	35.8 (1957)	41.5
Iran	N.A.	N.A.	N.A.	20.0	31.4 (1956)	41.3
Turkey	N.A.	24.2 (1927)	24.4	21.9	28.8 (1955)	38.7
Sri Lanka	12.9	13.2	15.4 (1946)	15.3 (1953)	17.6 (1956)	22.4
India	11.2	12.0	13.8	17.3	18.0	19.9

Source : (i) The World Cities—Peter Hall
(ii) Demographic year Books UNO 1948, 1955, 1960, 1962 and 1973.
(iii) Census India, 1971.

MRTS Network as Recommended by various Techno-economic Feasibility Studies

City	Alignment	Length (Kms)	Estimated Cost (Rs. crores)	
1	2	3	4	
Calcutta				
Phase I (under execution)	Dum Dum Tollyganj (mainly underground)	16.4	250.00	1973 prices
Phase II	(i) Extension of Dum Dum Tollyganj	8.1	6.39	
	(ii) Salt Lake City to Ramrajtala	17.1	28.06	
Phase III	Dakshineswar to Thakurpukar	26.7	38.36	
Bombay				
6th Corridor	(i) Raoli Junction—Fort Market	10.2	160.00	1974 Prices
	(ii) Bandra-Goregaon	12.24		
	(iii) Kurla-Bhandup	11.72		
7th Corridor	(i) Kolaba-Bandra (UG)	17.38	450.0	
	(ii) Bandra-Kurla (Elevated)	4.90		
	(iii) A Spur to Airport	4.11		

Delhi

		Length (kms)		Est. Cost (Rs. crores)	
		1981 net work	2001 net work	1981 net work	2001 net work
I. Underground & Elevated corridors	(i) Connaught Place-Rajouri Garden-Najafgarh	10.8	32.8*	186.29	358.32
	(ii) Indian Institute of Technology-Inter State Bus Terminus	19.3	19.3	309.73	309.73
	(iii) Delhi Gate-Radhey Shyam Park	5.8	5.8	63.70	63.70
	Total : I	35.9	57.9	559.72	731.75

*Includes 16 kms on surface.

Annexure 12. III (contd)

1	2	3		4	
		Length (kms)		Est. Cost (Rs. crores)	
		1981 net work	2001 net work	1981 net work	2001 net work
II. Surface Corridors	(i) Sahibabad-Tughlakabad	34.4	34.4	128.40	128.40
	(ii) Delhi-Badli-Narela	13.4	25.4	49.77	85.85
	(iii) Sadar Bazar-Nangloi-Tikrikalan	16.6	25.6	50.10	75.40
	(iv) Nizamuddin-Sarai Rohilla	22.7	22.7	58.01	58.01
	(v) Patel Nagar-Palam-Bijwasan	9.6	16.5	24.87	39.93
	Total : II	96.7	124.6	311.15	387.59
	Total : I & II	132.6	182.5	870.87	1,119.34
				(1974-75 prices)	
Madras	North-South-Eastern Corridor		20.38		155.00 (1975 prices)

Source : (i) Calcutta, Bombay and Madras—Rail Tariff Enquiry Committee Report—November, 1978 and Calcutta Mass Transit Study—October 1975.

(ii) Delhi—Mass Rapid Transit System-Project Report (Network & Priorities) January, 1975.

Growth of Intermediate Public Transport (IPT) Vehicles in Selected Cities in India

Vehicle Type	City	1972-73	1973-74	1974-75	1975-76	1976-77
1	2	3	4	6	6	7
	Calcutta	8,400	8,400	8,400	6,179	6,956
	Bombay	15,924	N.A.	19,824	N.A.	N.A.
	Delhi	4,985	4,985	4,973	4,996	5,138
	Madras	3,640	3,659	3,554	3,410	2,365
Taxi	Bangalore	864	1,002	1,008	1,020	1,045
	Hyderabad	987	N.A.	580	534	539
	Ahmedabad	314	375	3,398	438	466
	Pune (U.A)	539	583	660	678	679
	Meerut	-	-	-	-	-
	Faridabad-Ballabhgarh Complex	-	-	-	-	-
	Aurangabad	-	-	-	-	-
	Gurgaon City	-	-	-	-	-
	Calcutta	-	-	-	-	-
	Bombay	N.A.	N.A.	4,682	-	-
	Delhi	13,467	14,338	15,836	16,295	16,986
	Madras	597	861	900	1,140	1,440
	Bangalore	6,597	7,365	7,832	8,423	8,699
Auto-Rickshaw	Hyderabad	1,969	N.A.	2,764	3,985	5,812
	Ahmedabad	4,725	5,180	6,782	6,973	7,938
	Pune (U.A.)	3,678	4,705	5,619	6,307	7,149
	Meerut	-	-	-	-	-
	Faridabad-Ballabhgarh Complex	-	-	-	-	-
	Aurangabad	326	417	425	445	450

Annexure 12.IV (contd.)

1	2	3	4	5	6	7
	Calcutta	-	-	-	-	-
	Bombay	-	-	-	-	-
	Delhi	1,130	1,680	7,387	7,345	5,157
	Madras	2,392	5,203	5,334	5,351	5,513
Cycle-Rickshaw	Bangalore	221	276	39	N.A.	N.A.
	Hyderabad	12,699	N.A.	N.A.	N.A.	14,000
	Ahmedabad	1,500	1,608	1,704	1,884	2,083
	Meerut	6,993	7,284	7,774	8,565	8,717
	Faridabad-Ballabhgarh Complex	1,326	1,922	2,527	3,194	3,276
	Aurangabad	-	-	-	-	-
	Gurgaon City	N.A.	N.A.	N.A.	951	1,028
	Calcutta	-	-	-	-	-
	Bombay	-	-	-	-	-
	Delhi	1,542	2,495	2,470	2,273	1,962
	Madras	117	138	123	100	90
Tonga	Bangalore	236	637	514	N.A.	N.A.
	Hyderabad	N,A.	N.A.	N.A.	N.A.	N.A,
	Ahmedabad	-	-	-	-	-
	Pune (U.A.)	169	139	105	105	117
	Meerut	400	468	482	495	584
	Faridabad-Ballabhgarh Complex	-	-	-	-	-
	Aurangabad	35	77	N.A.	124	43
	Gurgaon City	N.A.	N.A.	N.A.	25	30

Source : Research Study on "Objective Assessment of the Role of Intermediate Public Transport in Different Sizes" by the School of Planning & Architecture, New Delhi.

Chapter 13

Air Transport

13.1 Introduction

13.1.1 Compared to road and rail transport, civil aviation is a newcomer to the Indian scene. Its potential was first demonstrated in 1911, when an aircraft carried mail from Allahabad to Naini, across the Ganga River, covering a distance of about 10 kilometres in nearly as many minutes. But it was only in 1924 after World War I, that Britain's Imperial Airways brought the first regular air-service to India, its purpose being to provide a link with the U. K. Domestic air service began with Tata Airways being established in 1932. In 1933, its first full year of operation, the airline carried 155 passengers and 10.71 tonnes of mail. A few more airlines were founded and some civil airports constructed during the years from 1932 to 1939. While every encouragement was given by government and the travelling public, the airlines remained a minor part of the country's transportation system. Their aircraft were mostly single-engined, with little capacity for passengers and cargo. Financially, they survived on government subsidies.

13.1.2 World War II saw the construction of about a hundred military airfields on the sub-continent and brought in numbers of military transport aircraft, the more notable being the twin-engined DC 3 (Dakota). With the end of the War, more of the airfields not required for military use were taken-over by the Department of Civil Aviation, and surplus Dakotas were sold to private operators. The latter had them converted for commercial use, in which role the aircraft carried 24 to 28 passengers or about three tonnes of cargo. Within a short period of time, 22 airlines were registered but by 1953 only nine survived. Eight of these were domestic operators and one—Air India International-operated services to countries in Europe, Africa and Asia. While the Dakota did much to promote air travel, its operating economics were poor, domestic air fares were pegged at a low level and the airlines had to depend on government subsidies for their survival. Eventually, in August 1953, all nine airlines were nationalised, the eight domestic carriers being merged to form Indian Airlines (IA). Air India International later designated Air India (AI), retained its separate identity after nationalisation. In its first full year of operation (1954-55) Indian Airlines carried 0.48 m. passengers and handled 52.96 m. tonnes kms against a capacity of 75.94 m. available tonne kms. Between them, the two Airlines carried during 1978-79 some 6.5 m, passengers and hundred thousand tonnes of cargo and mail. Of this Indian Airlines carries 5.3 m. passengers and 63,000 tonnes of cargo. Today, Indian Airlines serves 69 stations, 62 of them within India, and Air India, 45 cities in 41 countries.

13.1.3 Air transport primarily caters to passenger traffic, but its share of the total passenger traffic in the country is only one per cent. It has, a distinct advantage over surface transport due to its superiority in speed and substantial saving in time over long distances. On long-haul sectors connecting metropolitan cities such as Bombay-Delhi, Delhi-Calcutta and Bombay-Madras, it handles significant volume of traffic.

13.2 Growth of Domestic Air Traffic

13.2.1 Domestic air traffic in the country is mostly carried by Indian Airlines, the total traffic carried having increased from 83.20 m. revenue tonne kms (RT kms) in 1960-61 to 390.96 RTkms in 1978-79. Domestic air traffic has been continuously increasing at an annual growth rate of around 12 to 15 per cent. In the last two years the growth rate has been 16 per cent in 1977-78 and 20 per cent in 1978-79.

Data Source : Indian Airlines

13.2.2 The shares of passenger traffic, in IA's total business was nearly 85 per cent in 1978-79. Cargo constituted 23 per cent of the traffic in 1960-61 but is now around 10 to 12 per cent. The changing composition of traffic carried by Indian Airlines over the year is indicated in table 13.1.

Table 13.1

Indian Airlines

Passenger, Cargo, Other Traffic, Capacity and Load Factor

(T kms in million)

Year	Revenue Tonne kilometres					Available	Load
	Passenger	Cargo	Mail	Charters	Total	Tonne Kilometres	Factor
1	2	3	4	5	6	7	8
1960-61	53.5 (64.4)	19.5 (23.5)	6.1 (7.4)	3.9 (4.7)	83.2 (100.0)	113.1	73.6
1965-66	86.4 (79.9)	11.2 (10.3)	9.5 (8.8)	1.0 (1.0)	108.1 (100.0)	155.1	69.7
1968-69	127.7 (83.3)	15.5 (10.1)	9.9 (6.4)	0.3 (0.2)	153.4 (100.0)	208.3	73.6
1973-74	156.4 (84.8)	17.8 (9.6)	10.2 (5.5)	0.1 (0.1)	184.5 (100.0)	270.7	68.2
1974-75	183.2 (86.1)	18.5 (8.7)	11.0 (5.1)	0.2 (0.1)	212.9 (10.0)	310.8	68.5
1975-76	213.6 (85.8)	22.5 (9.1)	12.6 (5.0)	0.1 (0.01)	248.8 (100.0)	352.8	70.6
1976-77	239.0 (86.1)	25.7 (9.3)	12.7 (4.6)	0.1 (neg)	277.5 (100.0)	393.7	70.6
1977-78	275.7 (84.8)	35.7 (11.0)	13.4 (4.1)	0.2 (0.1)	325.0 (100.0)	480.9	67.6
1978-79	330.6 (84.5)	45.8 (11.7)	14.4 (3.7)	0.1 (neg)	390.9 (100.0)	558.8	70.0

Figures in brackets indicate percentage share

13.3 Passenger Traffic

13.3.1 The number of passengers flown by internal air services increased from 0.79 m. in 1960-61 to 5.33 m. in 1978-79. Passenger kms (RPkms) in the corresponding period increased from 614.m. RPkms to 4081 m. RPkms while available seat kms increased from 864 to 5569 m., as is shown in table 13.2.

Table 13.2

Indian Airlines

Growth of Passenger Traffic

(In million)

Year	Passengers	Revenue passenger Kilometres	Available* Seat Kilometres
1	2	3	4
1960-61	0.79	614	864
1965-66	1.20	985	1419
1968-69	1.96	1445	1986
1973-74	2.48	1904	2701
1974-75	2.90	2230	3216
1975-76	3.36	2609	3871
1976-77	3.80	2927	4129
1977-78	4.37	3389	4806
1978-79	5.33	4081	5569

* Only scheduled services.

13.3.2 Flight services of Indian Airlines are mainly on trunk routes, accounting for 65 per cent of total domestic air passenger traffic. Seven major routes connecting metropolitan cities handle nearly 50 per cent of total passenger traffic, as is indicated in table 13.3.

Table 13.3

Indian Airlines

Passenger Traffic on Major Trunk Routes (1978-79)

S. No.	Route	Distance	No. of passenger (000)	Pkms (million)	Seat factor %
1	2	3	4	5	6
1.	Bombay-Delhi	1147	536	615.69	80.4
2.	Bombay-Calcutta	1685	144	243.12	71.2
3.	Delhi-Calcutta	1320	234	309.09	69.1
4.	Delhi-Madras	1761	191	266.33	81.2
5.	Bombay-Madras	1091	192	208.76	72.4
6.	Bombay-Bangalore	875	190	166.39	91.4
7.	Calcutta-Madras	.1387	68	93.92	74.2
	Total 7 routes		1555	1903.37	
	Total System		5330	4081.00	

13.3.3 Other major sectors covered by Indian Airlines are the north-east region and on west coast Saurashtra region, alternative surface transport being through circuitous routes and difficult because of natural obstacles.

13.3.4 Tourist traffic is an important segment of the business of Indian Airlines. It has grown at a higher rate than other categories of passenger traffic. In 1972-73 foreign exchange earnings of Indian Airlincs constituted about 17 per cent which increased to 30 per cent in 1978-79, as would be seen from table 13.4

Table 13.4

Indian Airlines Tourist Traffic

Year	Total No. passenger Boarding (in lakhs)	Estimated number of tourist (in lakhs)	Total Earnings (in Rs. crores)	Earning in foreign exchange (in Rs. crores)	Percentage of foreign exchange earnings to total earnings
1	2	3	4	5	6
1972-73	29.9	5.2	58.3	10.20	17.5
1973-74	24.8	4.8	57.1	10.98	19.2
1974-75	29.0	6.0	80.5	16.66	20.6
1975-76	33.6	8.4	93.4	23.42	25.0
1976-77	38.0	9.5	111.0	28.60	25.1
1977-78	43.7	10.8	130.3	41.23	31.6
1978-79	53.3	13.3	156.9	47.02	30.0

13.3.5 After standardisation and modernisation, the fleet mix of Indian Airlines has changed substantially. Piston engined aircraft such as the Dakota have been retired and relatively low-capacity, turbo-prop aircraft are being replaced by high capacity jet aircraft. This has caused a reduction in the airline fleet, from 99 aircraft in 1953 to 48 aircraft in 1978-79, even while the capacity generated and traffic carried have increased manifold. This modernization of the fleet with more efficient high capacity aircraft has enabled the air line to do without subsidies and generate its own resources for growth. About 85 per cent of available seat kms today are provided by Boeing 737 and Airbus (AB-300) aircraft which operate on all major routes. Turbo-prop aircraft meet the requirements of the north-east, Saurashtra region and other low-density routes. Available seat kms aircraft-wise are given in table 13.5.

Table 13.5

Indian Airlines

Available Seat Kms Aircraft-Wise

(In million)

Aircraft	1960-61	65-66	68-69	73-74	74-75	75-76	76-77	77-78	78-79
1	2	3	4	5	6	7	8	9	10
Viscount	422	370	378	90	27	22	18	7	—
Skymaster	152	36	13	—	—	—	—	—	—
Dakota	289	134	48	22	—	—	—	—	—
Caravelle	—	554	1066	754	1069	901	466	151	113
F 27	—	189	326	196	230	232	236	206	189
HS 748	—	—	122	286	366	427	497	505	493
B 737	—	—	—	932	1240	2289	2514	2488	2767
Air bus	—	—	—	—	—	—	398	1446	2007
Total(including hired aircraft)	864	1419	1986	2701	3216	3871	4129	4806	5569

13.4 Operating Performance and Profitability of Indian Airlines

13.4.1 Indian Airlines operate 114 services (100 domestic and 14 international) of which only 35 meet the total operating expenses and provide a surplus as shown in table 13.6.

Table 13.6

Indian Airlines
Year-wise Revenue and Costs of Operating Services

Year	Total Services	Revenue Rs. in crores	Cost in Rs. Crores	Surplus/-(Deficit) Rs. crores	No. of Services meeting TOC*	Surplus on services meeting TOC* Rs. crores	No. of services not meeting TOC*	Deficit on routes not meeting TOC* in Rs. crores	No. of Stations served.
1	2	3	4	5	6	7	8	9	10
1965-66	85	21.20	23.00	—1.80	17	2.81	68(80%)	4.61	59
1966-67	71	24.49	29.75	—5.26	11	1.17	60(85%)	6.43	55
1967-68	78	31.75	34.24	—2.49	22	3.54	56(72%)	6.03	58
1968-69	92	36.88	37.23	—0.35	23	5.42	69(75%)	5.77	60
1969-70	95	42.49	44.89	—2.30	21	5.76	74(78%)	8.16	63
1970-71	103	39.55	48.54	—8.99	15	2.70	88(85%)	11.69	65
1971-72	102	51.50	60.68	—8.98	21	6.19	81(79%)	15.17	67
1972-73	101	66.46	71.78	—5.32	22	8.60	79(78%)	13.92	70
1973-74	115	62.26	69.18	—6.92	23	7.34	92(80%)	14.26	52
1974-75	93	90.13	95.68	—5.55	22	10.20	71(76%)	15.75	54
1975-76	93	103.52	101.14	+2.38	25	16.86	68(73%)	14.48	56
1976-77	111	121.91	109.54	+12.44	34	25.46	77(69%)	13.02	58
1977-78	105	144.27	135.36	+8.91	35	22.41	70(67%)	13.50	61
1978-79	114	171.44	167.78	+3.66	35	21.32	79(69%)	17.66	62

* Total Operating Cost.

(Figures in brackets indicate percentage of the services not meeting total operating cost.)

13.4.2 Of the 35 services which generate a surplus, 14 on seven trunk routes, namely, Bombay-Delhi, Bombay-Calcutta, Delhi-Calcutta, Delhi-Madras, Bombay-Madras, Bombay-Bangalore, Calcutta-Madras, account for 50 per cent of total passenger business. These services also contribute 75 per cent of financial surplus generated by Indian Airlines. Except the Bombay-Bangalore sector, length of haul of all other services on these routes is over 1,000 kms and services are on jet aircraft with high seat factors, as indicated in table 13.3.

13.4.3 Services that meet their direct operating cost are 39 ; those not covering their direct operating cost are 40. The latter services are generally short-haul and operated by turbo-prop aircraft. Some of the services running into deficit are indicated in table 13.7.

Table 13.7

Indian Airlines

Major Deficit Incurring Routes—1977-78

Sl. No.	Route	Losses (Rs. lakhs)	Major Aircraft deployed	Load Factor (in percentage)
1	2	3	4	5
1.	Bombay-Ahmedabad-Udaipur-Jodhpur-Jaipur-Delhi.	51.37	HS 748	53
2.	Calcutta-Bhubaneshwar-Visakhapatnam.	50.26	F 27	54
3.	Delhi-Agra-Khajuraho-Varanasi.	48.55	B 737	57
4.	Delhi-Kanpur-Gorakhpur-Varanasi-Calcutta.	87.77	F 27	46
5.	Delhi-Gwalior-Bhopal-Jabalpur-Raipur-Indore-Bombay.	66.27	HS 748	71
6.	Delhi-Jaipur-Udaipur-Aurangabad-Bombay.	46.66	B 737	72

(The average length of haul on these services is approximately 300 kms)

13.4.4 Profitability of air-services is linked with the cost which, in turn, are affected by length of haul and type of air craft. Cost per available tonne km varied significantly from Rs.2.47 per available tonne km in the case of Airbus and Rs. 2.87 in case of Boeing 737 to 5.04 in case of HS 748 and Rs. 5.85 in case of F 27 in 1978-79.

13.5 Short Haul Air Services

13.5.1 The economics of operations of almost all aircraft show that the break-even seat-factor is inversely related to distance, as can be seen in table 13.8. Even jet aircraft, which are economical in fuel consumption, do not make a route profitable when the sector distance is small.

For the Airbus, for example, minimum sector distance to break even is 300 kms with minimum of 200 passengers per trip. It is mainly on account of the short length of haul that the multistop services of Indian Airlines are not commercially viable.

Table 13.8

Indian Airlines
Effect of Distance on Break-Even Seat Factor (1977)

Sector Distance (kms)	Break-Even Seat Factor (%)			No. of seats required to be occupied to break-even		
	Boeing 737	Turboprop	Airbus	Boeing 737	Turboprop	Airbus
1	2	3	4	5	6	7
200	98	110	—	123	—	—
300	90	106	75	113	—	208
400	66	84	57	84	40	158
500	60	80	51	76	38	142
600	57	77	47	72	37	131
700	54	76	44	68	36	122
800	52	75	42	65	36	117
900	49	73	41	62	35	114
1000	49	75	40	62	36	111
1100	48	78	40	60	37	111
1200	48	82	39	60	39	108
1300	47	86	38	59	41	106
1400	47	91	38	59	44	106
1500	46	96	38	58	46	106
1600	45	99	38	57	48	106
1700	45	—	—	57	—	—
1800	44	—	—	55	—	—

Available number of seats : Air Bus -278
Boeing 737-126
Turbo-prop -48
(HS 748)

13.5.2 While trunk routes meet the demand of long distance passengers, for whom time saving is a significant consideration, some regional services as in the north-east, the west coast and in Saurashtra also lead to saving in time vis-a-vis surface transport. In these areas, air transport is vital for a smooth communication system. A few routes where surface and air distances vary significantly are shown in table 13.9. For these routes air tariffs are competitive, in some cases even lower than first class rail fares.

Table 13.9

Variation In Surface And Air Distances On Some Routes

Route	Distance by Air (kms)	Distance by Rail (kms)
1	2	3
Bombay-Bhavnagar	304	761
Bombay-Cochin	1080	1955
Bombay-Mangalore	715	2035
Calcutta-Silchar	529	1389
Calcutta-Agartala	374	1724

13.5.3 Where distance is short, adequate alternative modes of surface transport are available and time saving is marginal, air traffic is not significant. The services between important cities such as Delhi-Kanpur, Delhi-Jaipur, Delhi-Agra, and Calcutta-Bhubaneshwar incur a loss in operation due to the short haul nature of service, as is brought out in table 13.7.

13.5.4 We have discussed the question of short haul air services in our Report on the subject submitted in March 1979. While in the totality of circumstances we do not support the proposal for a general expansion of short haul air services, there are certain areas having inadequate surface transport facilities where for more than one reason air transport facilities need to be developed. The north-eastern region, we are convinced, suffers from a lack of adequate transport facilities leading to a feeling of isolation. As stated in our earlier Report we consider that there is a clear need for the following places to have air links:

Assam

1. Rupsi

Meghalaya

2. Shillong

Tripura

3. Kamalpur
4. Kailashahar

Sikkim

5. Gangtok

West Bengal

6. Cooch Behar

Arunachal Pradesh

7. Along
8. Passighat
9. Itanagar
10. Ziro
11. Tezu
12. Deborijo
13. Sadiya

Mizoram

14. Aizawl

13.5.5 We understand that the Government of Bhutan is anxious to be linked with India by an air service. We, therefore, recommend that Paro should also be included in the north-eastern network of domestic air services.

13.5.6 We also recommend that Kavaratti (Lakshadweep) should be linked by an air service of Indian Airlines.

13.5.7 To operate the services in the north-east region we have recommended in our earlier Report the formation of a separate airline with the Government of India, concerned States, the north-eastern council and Indian Airlines as partners. Capital and operating losses should be shared by the Central Government and concerned States in an agreed manner. Likewise operating losses, if any, on operating and air service to Kavaratti, should be met by the Central Government. We have also suggested that private operators could be allowed to run short haul services to such places as are not served by Indian Airlines, provided infra-structural facilities could be made available with small investments. In case a private operator runs an air service on any route at the instance and direction of the Government, subsidy should be provided to him on the same scale and in the same manner as for Indian Airlines.

13.6 Fuel Consumption

13.6.1 Fuel consumption is an important factor governing costs and profitability. Fuel costs account for neariy one-third of total operating expenses of Indian Airlines and are now the single largest item of expenditure. Fuel expenses as a percentage of operating expenses have been varying over the years. In 1971-72 their share was 24 per cent of operating expenses but increased to 42 per cent in 1974-75. Staff expenses, the largest item of expenditure at 37 per cent of operating expenses in 1971-72, now account for about 20 per cent of total operating expenses. Details are given in the table 13.10.

Table 13.10

Indian Airlines
Percentage Share of Operating Expenses

Year	Staff cost	Fuel and oil	Landing and parking charges	Insurance and Depreciation	Others
1	2	3	4	5	6
1971-72	37.2	24.1	2.4	17.0	19.3
1972-73	35.3	26.8	2.5	12.9	22.5
1973-74	33.6	26.8	2.0	13.1	24.5
1974-75	24.8	42.0	1.7	10.8	20.7
1975-76	27.4	40.0	2.0	11.7	18.9
1976-77	25.0	35.5	2.2	13.4	23.9
1977-78	20.0	32.4	3.7	14.5	29.4
1978-79	21.0	30.7	6.6	15.1	26.6

13.6.2 Turbo-prop aircraft are heavy on fuel and consequently their cost of operation is high. It is this factor that leads to losses on many routes of Indian Airlines. One way to improve the economics of these services is to replace turbo-prop by jet aircraft. This is already being done, particularly with replacment of Dakotas and Viscounts which accounted for the bulk of the fleet in the 60s. As a result, consumption of aviation fuel per million available seat km showed a declining trend. In 1970-71 the average fuel consumption rate was 83 kilolitres per million ASKms which fell to 54 kilolitres per million ASKms in 1978-79. The policy of replacing turbo-prop by jet aircraft has paid rich dividends to Indian Airlines. Most of the traffic of Indian Airlines is already being carried by Jet aircraft and there does not seem to be much scope for a further decline in the rate of fuel consumption unless there is a major break-through in technology. The present rates of fuel consumption of aircraft, together with seating capacity, are shown in table 13.11.

Table 13.11

Indian Airlines

Fuel Consumption and seating Capacity of Different Aircraft

Type of Aircraft	No. of seats available	Fuel consumption per million ASKms (in Kilo-litres)
1	2	3
Air Bus	278	42
Boeing 737	126	55
HS 748	48	80
F 27	40	75

13.6.3 There is a big gap between seating capacities of turbo-prop and jet aircraft presently used by Indian Airlines. Looking at traffic density between pairs of points and load factors of existing turbo-prop aircraft, in our view there is an urgent need to consider acquisition of an aircraft of suitable capacity with lower operating costs.

13.7 Tariff Structure of Indian Airlines

13.7.1 Tariffs charged by Indian Airlines are not cost-oriented. In general short-haul services cost more than tariffs charged and long-haul services less. As a result long distance traffic subsidises short distance traffic. Profitability is also affected by the low tariff charged in the eastern sector. The telescoping of fares between long and short hauls is not sharp on Indian Airlines, compared to airlines elsewhere, as is clear from table 13.12 The tariff for short hauls should be significantly higher than for long hauls.

Table 13.12

Fares per km for different distance zones (March 1978)

(In US Cents)

Distance Range (in km)	Australia	Canada	France	U.S.A.	India
1	2	3	4	5	6
100-200	19.34	—	24.33	22.00	
200-300	12.78	13.91	20.63	11.49	5.96
300-400	—	12.50	16.21	10.40	5.48
400-500	11.63	10.59	16.43	—	6.49
500-600	—	—	15.63	—	5.58
600-700	9.14	9.12	13.33	8.24	6.09
700-800	9.07	—	—	7.93	5.40
800-900	—	8.29	—	7.54	5.41
900-1000	—	8.02	10.95	7.04	5.50
1000-1100	—	—	—	—	5.53
1100-1200	8.33	—	—	—	5.32
1200-1300	—	7.13	—	—	5.22
1300-1400	8.19	—	—	—	5.30

13.7.2 Fare structure policy is an important instrument for regulating traffic growth and for optimising capacity utilisation. We suggest that Indian Airlines should be given more freedom in formulation of its fare structure. As it handles mainly passenger traffic and caters to a market distinct from that of rail and road transport, we hold the view that fare revision would not affect the general economy. However, in order to provide a safeguard against an arbitrary revision of fares by the Indian Airlines, we recommend that fare revision proposals could be examined by the National Transport Commission proposed by us. In case the Commission is not set up, we recommend reconstitution of the Air Transport Council, provided in the Air Corporation Act, 1953, to deal with the question of fare revisions.

13.7.3 It is necessary for Indian Airlines to rationalise its tariff structure to make it cost-oriented. This will assist in co-ordinating traffic flow to the right mode and provide a rational inter-modal mix of traffic, particularly for medium and short haul routes.

13.8 Future Role of Indian Airlines

13.8.1 Air transport has a definite advantage in travel time over long distances and on some regional routes where the alternative surface transport is through circuitous routes or difficult terrain as in Saurashtra area and the north-east region. In sectors where alternative surface transport is adequate and time saving is not significant, air transport has a limited function. With a rationalised fare structure there is likelihood of a shift in demand from air transport to other modes, such as rail and road, particularly over short and medium distances, where the difference in time taken for travel by surface and air transport is not significant. This is especially so for sector distances up to 200 kms There is, therefore, need for assessing total transport requirements of such sectors carefully and investment so planned as to enable traffic to move by the most economic mode.

13.8.2 Based on a systems study conducted by Indian Airlines (1977) the growth of traffic was estimated at 10 per cent per annum. The growth of traffic for the future has been similarly estimated up to 1982-83, using 1978-79 traffic as the base year. As the base would be increasing continuously a growth rate of 8 per cent has been assumed after 1982-83. With constraints on oil availability, expansion of a transport mode, which is energy-intensive, would have to be considered carefully. In sectors where adequate alternative modes of transport are available, air transport expansion may not be desirable or necessary. The future traffic demand for domestic air transport till the turn of the century is indicated in table 13.13.

Table 13.13

Indian Airlines
Estimates of Traffic Demand

Year	Revenue Passenger kms (Million)	Passenger (Million)
1	2	3
1978-79 (actual)	4080	5.33
1982-83	5900	7.75
1987-88	8600	10.54
1992-93	12700	16.74
2000-01	23600	31.00

13.8.3 In order to meet traffic demands projected up to 2000-01 A.D. there will be a need for the acquisition capacity equivalent of nearly 160 Boeing 737 aircraft on the assumption of 75 per cent seat factor. The aviation fuel likely to be required by 2000-01 A.D. will be about 1.35m, tonnes as against 0.24m. in 1978-79.

13.9 International Traffic by Air India

13.9.1 In the past attempts were made to integrate and co-ordinate Indian Airlines and Air India services. Air India operates some domestic flights, and Indian Airlines medium distance international routes. Indian Airlines has air services to seven neighbouring countries. In recent year emergence of the India-Gulf service as one of the fastest growing routes, contributing a substantial share in traffic, also necessitated integration of the two airlines. Passenger traffic by Air India mainly depends on B-747 aircraft, designed for long distance traffic. However, the Airbus may bee bettr suited for medium distance flights such

as the India-Gulf route. We understand that a joint system study by the two airlines is being made for co-ordinating and integrating their fleet strengths. This is a step in the right direction.

13.9.2 Traffic by Air India accounts for about 1.5 per cent of total international passenger and freight traffic. The growth rate of traffic on Air India was about 13 per cent in 1960-70 which rose to 16 per cent in 1970-78, While passenger traffic on Air India has grown nine times, from 1960-61 to 1977-78, freight traffic increased 13 times. Freight traffic accounts for nearly one-third of total traffic handled on Air India. Traffic growth and capacity over the years is given in table 13. 14.

Table 13.14

Air India
Growth of Traffic And Capacity

(In million)

Year	ATkms+	RTkms					Total international* traffic RTKms
		passenger	Charter	Mail	Freight	Total	
1	2	3	4	5	6	7	8
1960-61	161	51	1	5	19	76	4,283
1965-66	324	97	neg	8	44	149	9,742
1970-71	516	177	5	9	84	275	20,837
1971-72	616	191	16	8	102	317	22,007
1972-73	830	242	42	9	126	419	26,068
1973-74	898	297	25	9	164	495	32,035
1974-75	738	236	20	9	141	406	34,388
1975-76	976	344	12	11	215	582	36,509
1976-77	1133	434	10	13	240	697	41,064
1977-78	1166	458	9	15	248	780	45,664

\+ Available tonne kms.

* For calendar year.

Source : Air India

13.9.3 Air India has been continuously showing profits from 1973-74. In 1977-78 the total surplus amounted to Rs. 28.45 crore. To meet the growing demand Air India acquired the Boeing 747, a modern wide-bodied aircraft. The fleet of Air India on 31st March, 1978 comprised nine Boeing 707 and five Boeing 747 aircraft.

13.10 Infrastructure Facilities

13.10.1 The International Airports Authority of India (IAAI) and Director General Civil Aviation (DGCA) are responsible for providing infrastructural facilities to the airlines. Constituted in 1972, IAAI is responsible for management and development of the four international airports, namely, Bombay, Calcutta, Delhi and Madras, which handle 40 per cent of all domestic flights and most of the international air services. IAAI's development programme includes construction of and modification to terminal buildings, construction and improvement of runways, taxi tracks and apron,

and supply of electrical and fire-fighting equipment. Infrastructural facilities in the shape of construction and improvement of runways, taxi tracks, aprons, and terminal buildings at domestic airports are provided by the Department of Civil Aviation under the DGCA. The DGCA is also responsible for providing communication and navigational aids along air routes and at all airports, including international airports.

13.10.2 Infrastructural facilities have not kept pace with development programmes of Indian Airlines and Air India. Safety-oriented equipment is not satisfactory, in spite of the emphasis on its need in five year plans. There is heavy congestion at peak hours, particularly at the four international airports, as is evident from table 13.15.

Table 13.15

Peak Hour Capacity And Demand For Handling Passengers At International Airports

(1978-79)

Airport	International				Domestic			
	Present Capacity		Present Demand		Present Capacity		Present Demand	
	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.
1	2	3	4	5	6	7	8	9
Bombay	550	550	1250	1250	650	750	870	870
Calcutta	250	250	250	200	350	350	375	550
Delhi	300	350	400	400	500	650	530	900
Madras	150	150	200	200	400	275	320	320

Source: International Airports Authority of India.

13.10.3 While there is a need to even out traffic peaks, factors that limit this effort should be clearly recognised. In the past few years both Indian Airlines and Air India have acquired aircraft of larger capacity. Other international airlines have also introduced large capacity aircraft. With the geographical position of India and night curfew imposed by some countries, traffic originating outside India usually passes through our international airports at night, creating serious congestion at Bombay and Delhi. For domestic traffic as well, Indian Airlines has to arrange its flight schedules to ensure maximum fleet utilisation, taking into account consumer preference for daytime travel which entails peaks in the mornings and again in the evenings. In addition to providing facilities to handle passenger traffic, there is need to augment capacity to deal with cargo, both domestic and international.

13.10.4 International Airports Authority of India

13.10.4.1 As an undertaking, IAAI, though young in years, has had a good performance record with continued profit shown since its inception. This can be seen in table 13.16.

Table 13.16

I.A.A.I.-Financial Results (Rs. crores)

Item	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78
1	2	3	4	5	6	7
Capital	27.11	30.67	32.36	34.34	37.29	48.42
Revenue	7.80	8.38	9.22	11.56	13.96	21.49
Expenditure	4.20	5.45	6.68	7.46	10.64	13.83
Profit before tax	3.60	2.93	2.54	4.10	3.32	7.66
Profit after tax	1.58	1.61	1.30	1.63	0.92	3.00

Source: IAAI annual report 1977-78

13.10.4.2 Although IAAI has maintained a return of 10 to 15 per cent, internal resources are inadequate to meet expansion programmes. Notwithstanding projects in hand and contemplated in the near future, it is estimated that the capacity offered at our international airports will continue to lag far behind the demand for it. Moreover, projects have been taken up only after physical bottlenecks have appeared in handling of traffic at the airports. One reason for it is absence of a long range plan and inadequacy of funds. In the initial stage, internal resources by themselves cannot cover a major expansion programme. In the last six years, although nearly 60 per cent of investments were funded through internal resources, the fast growing international and long-distance domestic traffic called for budgetary support for expansion programmes. To generate additional internal resources IAAI should devise a tariff structure for its services which should not only pay for investments already made but also finance expansion programmes on a long term basis.

13.10.5 Department of Civil Aviation

13.10.5.1 Indian Airlines at present covers 62 domestic stations, with nearly 50 per cent airports handling only one service a day. The works programme of the Department of Civil Aviation has emphasised strengthening and developing existing airports rather than constructing new ones, the immediate aim being to make them suitable for operation of jet aircraft. However, a number of airports are basically unsuitable for this purpose. The Director General of Civil Aviation should carry out a cost-benefit analysis by taking into account the likely investment required for improvement of infra-structural facilities and increase in revenues through landing and navigational charges.

13.10.5.2 Data on investment made so far in developing infrastructural facilities are not available, as DGCA accounts are not maintained in commercial terms. Although DGCA charges Indian Airlines and other users for its services, the revenue earned from landing charges is barely enough to meet expenditure. No surplus is available for servicing of capital, depreciation and development expenditure. If these items of expenditure are taken into account, then, apparently, air transport infra-structural facilities are subsidised by the general exchequer. Landing and other charges, at domestic airports are, at present, lower then those at international airports. It is understood that these charges are being increased from 1 April 1980 and will be at par with charges at international airports, which will improve the financial position. We feel that it is not appropriate to subsidise air passengers, and airport charges should be so fixed as to fully pay for investments made for services to airlines and air passengers. We also recommend that the Department of Civil Aviation should maintain its accounts on a commercial basis and revision in charges made in consultation with the proposed National Transport Commission.

13.11 Civil Aviation Development Fund

13.11.1 The Civil Aviation Development Fund (CADF) was created in 1964 to give financial assistance to Indian Airlines for the operation of uneconomic routes considered essential for regional development and for promoting tourism. The fund is financed from the excise duty on aviation fuel paid by the Corporation. We do not see the need or continuing this fund. Development programmes of the Indian Airlines should be through the internal generation of resources, and any financial assistance required for the development of the airlines or infra-structural facilities should come from the general revenues, as in the case of other modes of transport.

13.12 Summing Up

13.12.1 Air transport has a significant function in handling long distance passenger traffic which is also profitable to the airlines. In spite of the modernisation of the fleet, with a consequent reduction in the rate of fuel consumption, it is still an energy intensive mode of transport. Keeping in view the scarcity of oil resources, expansion programmes, particularly in sector where adequate alternative modes of surface transport exist, would need to be carefully considered. It would be desirable not to expand short haul services, except in certain regions where the alternative modes are not able to provide adequate service. The present tariff structure is not cost-oriented and short haul services are subsidised.

13.12.2 There is need to develop infra-structural facilities particularly at the international airports to meet the increasing traffic demands.

Chapter 14

Coastal Shipping

14 1 Introduction

14.1.1 Coastal trade in India is reserved exclusively for the Indian merchant marine under the Merchant Shipping Act, 1958. But coastal shipping, despite India's long coastline (5660 kms), with a number of ports (10 major, 168 minor including 23 intermediate ports) and a vast hinterland, has stagnated since the 1950's. The traffic handled by coastal shipping in the period 1951-1978 declined progressively and is now insignificant. In fact, but for wet cargo (POL), coastal trade, particularly passenger and general cargo business, is near extinction.

14.1.2 The decline in coastal traffic occurred despite Government subsidy support in the form of a subvention, equivalent to difference in freight cost of sea-cum-rail route and all-rail route, of coal movement by sea, which presently comprises over 60 per cent of total coastal dry cargo traffic. The subsidy on coal movement by coastal shipping amounted to about Rs.6 crores in 1975-76, the finances having been raised from funds through specific coal excise duty under Coal Mines Conservation and Development Rules.

14.1.3 With coastal trade stagnating, the number of vessels and gross registered tonnage, engaged in it have also remained static. In fact, total tonnage was maintained on account of wet cargo; otherwise the number of dry cargo vessels actually declined Generally, shipping companies have been reluctant to ply vessels on coastal trade unless they were compelled to do so by Government. Practically every coastal voyage that shipping companies recently made involved them in financial loss. Not only are shipowners reluctant to invest in acquisition of new vessels for coastal trade; in fact, they have shown a tendency to withdraw from this business as soon as vessels fall due for scrapping.

14.1.4 That coastal trade progressively declined is in sharp contrast to phenomenal traffic growth recorded by surface modes of transport since 1951. This poses the question whether the decline in volume of coastal business, in absolute as well as relative terms, is due to any economic disadvantage inherent in it, or whether it is due to distortions in tariff structure charged by competing surface modes, including government neglect in arranging for essential infrastructural facilities.

14.1.5 Coastal shipping is generally accepted as the most energy efficient and cheapest mode of transport for carriage of bulk traffic over longer distances. Like any other form of water transport, it entails no investment in line-haul capacity, except in navigational aids and terminal facilities. If coastal shipping has really such decisive advantage over other modes, particularly rail and road transport, it is essential not only to keep coastal shipping in business but also encourage it.

14.2 Present Status of Coastal Shipping

14 2.1 **Coastal Traffic :** The volume of traffic carried by coastal shipping from 1951 to 1978 is presented in table 14.1.

Table 14.1

Coastal Shipping Traffic 1951—1978

Year	Freight carried (in lakh tonnes)						Passenger carried (in lakhs)
	Dry Cargo					Total Cargo	
	Coal	Salt	General	Total	Wet Cargo		
1	2	3	4	5	6	7	8
1951	7.7	4.5	12.9	25.1	NA	NA	13.4
1956	11.0	4.8	10.2	26.0	11.8	37.8	9.4
1961	13.7	4.7	15.0	33.4	20.9	54.3	9.6
1962	19.8	4.8	16.4	41.0	23.3	64.3	NA
1966	7.0	3.3	15.0	25.3	30.6	55.9	9.2
1971	5.1	5.2	6.1	16.4	27.3	43.7	5.4
1972	5.3	5.3	8.5	19.1	21.0	40.1	5.1
1973	6.5	5.0	5.1	16.6	23.9	40.5	5.2
1974	4.9	4.8	5.0	14.7	29.1	43.8	3.8
1975	7.0	3.9	4.5	15.4	21.9	37.3	3.2
1976	5.7	2.3	1.5	9.5	23.4	32.9	NA
1977	6.6	1.1	1.3	9.0	23.9	32.9	NA
1978	6.7	2.2	2.0	10.9	24.2	35.1	NA

NA : Not avilable

Source : (i) Up to 1975 Ministry of Shipping & Transport (Directorate of Transport Research)
(ii) 1976 to 1978—Director General (Shipping).

14.2.2 A number of general observations can be made from data in table 14.1. First, passenger business by coastal shipping has declined steeply since 1961. Secondly, dry cargo volume increased from about 25 lakh tonnes in 1951 to 41 lakh tonnes in 1962 but thereafter decreased sharply. This decrease occurred in all the three main items of dry cargo, coal, salt and general cargo, but the fall was heaviest in general cargo. Thirdly, wet cargo traffic increased from less than 11 lakh tonnes in 1956 to nearly 31 lakh tonnes in 1966 but thereafter it remained static around 20 lakh tonnes.

14.2.3 A common explanation advanced for decline in coastal traffic, apart from inadequate provision of funds in the Plans, is the competition experienced by coastal shipping from railways and road transport. In particular, it has been argued that coastal shipping is suitable mainly for transport of bulk commodities, such as coal, salt, cement and foodgrains which are precisely the commodities for which railways rates are lower than for coastal shipping. Similarly, road transport has attracted almost the entire short and medium haul traffic along the coast because of its capacity to provide door-to-door service to users. Furthermore, coastal shipping tends to lose its cost advantage over surface mode if the point of origin or destination of a particular stream of

traffic is not located along the coast but further away in hinterland. In that case, transport of inland cargo by coastal shipping must not only bear additional transport and transhipment costs but cargo movement from hinterland to ports must also be geared to suit the pattern of arrival and departure of ships.

14.2.4 While competition with rail and road transport was an important factor in the decline of coastal shipping, this mode also lost its competitive edge because of a steep rise in operating costs. The rise in costs was due to a variety of factors, such as mounting costs of maintaining old vessels, rise in bunker costs, higher stevedoring rates, and pressure on wage bill as scales for manning of coastal vessels cannot be isolated from vessels plying on international trade. In addition, one single cause that has seriously affected competitive advantage of coastal shipping is the inordinately long time of waiting for ships in recent years at ports. Port delays caused heavy losses to shipping companies in standing costs they have to bear. This factor alone eroded all comparative advantage coastal shipping supposedly enjoyed over surface transport modes in movement of low-value, bulk traffic. Added to these disadvantages are draft restrictions at most ports precluding optimal utilisation of shipping capacity. There is also imbalance in coastal traffic movement as traffic is not equally available in both directions, making it necessary for coastal ships to sail in ballast. The empty movement occurs mainly on voyages from western to eastern coast of India, for while full coal load is generally available for movement from Calcutta and Haldia ports, the return cargo of salt is not available in full load on sailings from west coast ports. For example, in 1976 while 67 sailings carried 5.25 lakh tonnes of coal from Calcutta to destinations on east and west coasts, salt amounting to 2.42 lakh tonnes was available in reverse direction only for 36 sailings. Thus 3.1 sailings were performed in ballast.

Traffic Carried by Sailing Vessels

14.2.5 Apart from ships, traffic is also carried along the coast by sailing vessels. Vessels which featured prominently in the past in coastal trade declined in number, and traffic carried by them is also on decline. For instance, in 1960-61, sailing vessels carried about 14 lakh tonnes of cargo in coastal and 2 lakh tonnes in nearby overseas trade. This traffic gradually declined to 8 lakh tonnes (by about 43 per cent) in coastal trade and to 1 lakh tonnes in overseas trade over a period of 14 years. Table 14.2 shows trends in traffic carried by sailing vessels in 1960-61 to 1974-75.

Table 14.2

Cargo Carried by Sailing Vessels

(1960-61 to 1974-75)

Year (ending 31st March)	Cargo Carried (in 000' tonnes) Coastal	Near Trade	Total
1	2	3	4
1960-61	1,395	207	1,602
1965-66	1,355	137	1,492
1970-71	1,050	175	1,225
1971-72	952	101	1,053
1972-73	1,221	99	1,320
1973-74(a)	843	94	937
1974-75(a)	805	113	918

Source : Ministry of Shipping & Transport (Directorate of Transport Research)

(a) Figures relate to the calendar years 1974 and 1975.

Coastal Shipping Tonnage

14.2.6 A cargo-wise breakdown of coastal fleet is shown in table 14.3

Table 14.3

Coastal Fleet and Tonnage (GRT)* by Type of Vessels, 1951-78

Year ending 31st Dec.	No of vessels				Tonnage (000 GRT)			
	Total	Dry Cargo	Oil Tanker	Passenger-cum-cargo	Total	Dry cargo	Oil Tanker	Passenger-cum-cargo
1	2	3	4	5	6	7	8	9
1951	79	NA	NA	NA	217	NA	NA	NA
1956	85	NA	NA	NA	247	NA	NA	NA
1961	104	101	3	NA	362	338	24	NA
1966	95	92	3	NA	330	305	25	NA
1971	62	44	5	13	218	139	49	30
1972	59	43	4	12	201	133	38	30
1973	56	41	3	12	220	152	31	37
1974	61	46	5	10	279	201	52	26
1975	70	51	9	10	371	257	88	26
1976	80	61	9	10	442	327	88	27
1977	77	58	9	10	428	312	88	28
1978	72	54	8	10	400	292	80	28

NA : Not available

Source : Ministry of Shipping & Transport (Directorate of Transport Research).

* Gross Registred Tonnage (GRT) is the total of all permanently enclosed space above and below decks with certain exception such as the wheelhouse, chart room, radio-room, galley, washing facilities and other specified space above deck.

14.2.7 That fleet size engaged in coastal shipping has gradually declined is evident from the above table, the decline occurring due to a substantial fall in the number of dry cargo vessels. In terms of GRT total fleet tonnage on the coast has remained stagnant around 4 lakh GRT, the increase being due to rise in the number and size of oil tankers. At the end of 1978, total coastal tonnage was 4.0 lakh-2.92 lakh of dry cargo, 0.8 lakh wet cargo, and 0.28 lakh passenger-cum-cargo vessels.

14.2.8 Although 54 dry cargo vessels were registered for coastal trade in 1978, as many as 20 of them were licensed to operate in overseas trade. These include 10 Romanian colliers, originally acquired for coastal trade but later released for foreign voyages, and 10 other smaller vessels operating on Bombay-Gulf trade routes. Thus only 34 vessels were exclusively available for coastal trade. Of these only 10 vessels totalling about 100,000 DWT** are presently employed for coal and salt movement and another 18 small vessels in carriage of general cargo, including cement, clinkers and fertilisers; six vessels are empolyed exclusively for passenger-cum-cargo

** Dead weight tonnage (DWT) denotes number of tonnes of stores, fuel and cargo a ship can transport.

trade between mainland and Andaman Nicobar and Lakhshadweep groups of islands.

14.2.9 Table 14.4 compares freight rates prescribed by Government for coal and salt movement with financial costs of shipping operators. Coal freight is on liner trade basis and salt freight on Free In-Out Trimming (FIOT) basis. Freight rates presently in vogue are far below operator financial costs.

Table 14.4

Comparison of Shipping Freight Rates with Operator Costs

Commodity	Freight rates/operating costs betweeen pair of points (in rupees per tonne of cargo carried in 1976-77)				
	From	To			
		Tuticorin	Gujarat	Gujarat and Saurashtra	Calcutta
1	2	3	4	5	6
A. Freight rate					
Coal	Calcutta/ Haldia	95.3	101.8	105.0	-
Salt	Tuticorin/ Saurashtra ports				85.2 93 5
B. Financial cost (average)*					
Coal and Salt				158 5	

Source : Freight Rates D.G. (Shipping)

* Financial Cost refers to the year 1977-78. Cost data has been submitted by the Indian Coastal Conference to D.G. (Shipping)

14.2.10 We understand from the Director General of Shipping that coastal tonnage presently available is far short of cargo offerings. While available tonnage for dry cargo is about 3 lakh GRT, coal and salt offerings alone for 1980-81 are stated to be around 27 lakh tonnes. Besides, there is an offering of over 23 lakh tonnes in other cargo. The total offering for coastal movement for 1980-81 thus amounts to about 50 lakh tonnes, showing an excess demand for coastal shipping in relation to available shipping capacity. Such an imbalance has been the feature of coastal trade for some time. The Director General of Shipping, who shoulders the responsibility for finding requisite tonnage for coastal traffic, is often hard pressed for mobilising the required tonnage. Since no new capacity is added to coastal shipping, the only recourse available is to persuade shipping companies to release ships from relatively more lucrative international trade. Thus, there is a 'tug-of-war situation'. On the one hand ship-owners constantly press D.G. (Shipping) to release ships taken over by him for coastal trade under direction from the Central Government so that they may save themselves from further losses and deploy ships so released on more profitable international trade; on the other D.G. (Shipping) must mobilise requiste coastal tonnage to move

the volume of traffie he is required to carry to relieve pressure on the internal transport system of the country. Coastal shipping is thus a cinderalla of transport industry whom neither shipowners nor Government are willing to own and operate.

14.2.11 One reason for the present plight of coastal shipping is poor turn-round of vessels at coastal ports, especially from 1977 onwards. If normal conditions had prevailed, coastal operators contend that their vessels could have performed more voyages and existing tonnage would have been able to cover coastal trade fully. For example, although about 10 ships are programmed every month for coal movement hardly 5-6 vessels actually sail with coal which results in heavy backlog of cargo. As the same vessels, which load coal, are utilised for salt movement to Calcutta, coastal salt shipments are also adversely affected.

14.3 Economics of Coastal Shipping

Background

14.3.1 The problems of coastal shipping and rail-cum-sea co-ordination were studied at length by various bodies like Rail-sea Co-ordination Commitee (1957), Committee on Transport Policy and Co-ordination (1966) and Study Group on Rail-sea Co-ordination (1973). These committees examined the difficulties and problems of coastal shipping and expressed the view that as a considerable part of coastal trade is accounted for by a small number of commodities like coal, salt, cement and oil, it is with reference to these commodities that future potential for coastal shipping should be planned. The Committee on Transport Policy and Co-ordination, which examined in detail the relative economics of coal and salt movement by all rail route vis-a-vis rail-cum-sea route, found that with existing railway freight rates on low-rated bulk commodities and inadequate loading facillties at ports, coastal transport compared unfavourably with all rail movement. However, they expected that with the commissioning of Haldia port, costs of coastal shipping would fall substantially and make rail-cum-sea movement of coal and salt cheaper than all-rail movement to designated ports, except to Cochin and Bombay. Indeed, the committee anticipated shipment of 1.5 million tonnes of coal from the Bengal-Bihar coalfields to western and southern India by 1970-71. In actual practice, although Haldia port was commissioned in March 1977, the committee's expectations are yet to materialise.

Physical Limitations

14.3.2 Irrespective of overall national and strategic importance of coastal shipping, geographical factors and present pattern of coastal movement do not appear to promise this mode too great a role in an integrated transport network in the country. In the first place, ships going from the east coast to west coast have to make a detour around Sri Lanka since the passage between the Gulf of Mannar and the Palk Bay is not navigable. Such detour is also necessary for the voyage by sea from Calcutta to Tuticorin. The voyage from Calcutta and Haldia to ports on the west coasts, therefore, substantially longer than the corresponding distance by rail. The longer the distance by sea route, the greater the transit time and haulage costs. Even the advantage that coastal ships supposedly enjoy over surface mode of transport in energy use disappears as sea route haul becomes too long. Secondly, except for coast to coast movement, coastal shipping must depend upon inland mode of transport for getting cargo or carrying it to final destination points. Not only such multi-modal transporation involves double loading and other transhipment costs but shipowners have also to ensure that requisite cargo is available at ports for vessels to load immediately on arrival at berth.

Comparative Economics

14.3.3 The comparative economics of coastal shipping vis-a-vis surface transport modes do not, however, appear to be as hopeless as is widely believed even in the present operating conditions. Table 14.5 shows date on resource transport cost of coal and salt by rail, road, coastal shipping* and rail-cum-sea route as worked out by RITES.

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* Coastal shipping costs have been computed on the basis of voyage of four ships of the Shipping Corporation of India for 1976-77. Cost details, includiag assumptions made for purposes of cumputation, are given in the report on coastal shipping cost presented by RITES as part of transport policy planing project.

Coastal shipping costs for coal relate to port-to-port movement and other costs to movement from Andal coal-siding to selected destinations. Costs of moving coal by rail-cum-sea route are higher than that by rail and road to Surendera Nagar. They are comparable to rail costs for destinations such as Madurai, Cochin and Navalakhi, but lower than both rail and road costs for Tuticorin. Costs of movement of salt by coastal shipping to Calcutta are lower than rail costs both from Tuticorin and Bhavanagar. Table 14.7 presents comparative cost data in terms of indices with rail costs as a base.

Table 14.5

Resource Cost Comparison : Railways, Road Transport and Coastal Shipping

Commodity		Pair of Points	Resource cost per tonne in rupees as in 1976-77			Coastal Shipping * (Port to Port Movement)
			Railways	Road	Rail-cum-Coastal Shipping	
1		2	3	4	5	6
Coal	1.	Andal-Haldia Tuticorin-Madurai (1)	216.6	222.5	215.0	142.5
		Distance (in kms)	2,419	2,174	2,864	2390
	2.	Andal-Haldia-Cochin-Shoranpur (1)	177.6	226.5	206.5	143.7
		Distance (in kms.)	2,321	2,215	3,037	2,608
	3.	Andal-Haldia-Navalakhi-Surendra Nagar (1)	195.4	195.3	240.7	171.0
		Distance (in kms)	2,059	1,894	4,826	4,362
	4.	Andal-Haldia-Tuticorin (2)	234.3	240.1	183.7	142.5
		Distance (in kms.)	2,579	2,355	2,704	2,390
	5.	Andal-Haldia-Cochin (2)	187.1	237.8	186.9	143.7
		Distance (in kms.)	2,442	2,321	2,922	2.608
	6.	Andal-Haldia-Navalakhi (2)	209.1	211.2	212.3	171.0
		Distance (in kms.)	2,209	2,058	4,676	4,362
Salt	7.	Tuticorin-Calcutta	221.5	256.8	186.3	186.3
		Distance (in kms)	2,460	2,345	2,390	2,390
	8.	Bhavnagar-Calcutta	212.4	241.0	207.3	207.8
		Distance (in kms)	2,320	2,187	3,884	3,884

(1) These pairs of points correspond to present pattern of movement of rail coal.

(2) These movement are from pithead railway station to respective ports.

* Excluding rail journey costs.

Source : RITES

14.3.4 The cost analysis by RITES is based on existing operating conditions of coastal shipping. These conditions are by no means a proper guide for future policy on coastal shipping, first because the four vessels whose voyage data have been used for cost analysis are of relatively older vintage and secondly because it is based on average port stay of 19 and 18 days for coal and salt respectively and about 64 per cent utilisation of ship capacity. Empirical data used for the study is thus not representative of normal operating conditions. To study the sensitivity of costs to variation in operating conditions RITES has carried out analysis under five alternative assumptions for movement of coal and two alternative assumptions for movement of salt.

Assumptions for Coal

(i) Increase in capacity utilisation of vessels from existing 64 per cent to 85 per cent, with port stay period remaining unchanged at 19 days.

(ii) Decrease in port stay days to 10.4 but capacity utilisation of vessel remaining unchanged at 64 per cent.

(iii) Decrease in port stay period to 7.3 days from existing period of 19 days (This represents an ideal situation at ports). But capacity utilisation of vessels remains unchanged.

(iv) Increase in capacity utilisation of vessel from existing 64 percent to 85 per cent and decrease in port stay period to 10.4 days from existing 19 days.

(v) Increase in capacity utilisation of vessels from existing 64 per cent to 85 per cent and decrease in port stay period to 7.3 days from existing 19 days.

Assumptions for salt

(i) Increase in capacity utilisation of vessels from existnig 64 per cent to 85 per cent with port stay period remaining unchanged at 18 days.

(ii) Increase in capacity utilisation of vessels from existing 64 per cent to 85 per cent and decrease in port stay period to 15 days.

Results of sensitivity analysis are presented in tables 14.6 and 14.7. Table 14.7 compares indices of resource costs of coastal shipping with those of rail and road with rail costs as base.

Table 14.6

Resource Cost of Coastal Shipping : Sensitivity Analysis Results Under Different Assumptions

Commodity		Pairs of Points	Cost per tonne in rupees for 1976-77: As per 1976-77 conditions	Under different operating Conditions : Assumptions I	II	III	IV	V
1		2	3	4	5	6	7	8
Coal	1.	Andal-Haldia Tuticorin-Madurai	215.0	188.5	191.1	179.2	170.0	158.2
	2.	Andal-Haldia-Cochin-Shoranpur	206.5	185.3	188.5	176.9	164.0	155.4
	3.	Andal-Haldia-Navlakhi-Surendra Nagar	240.7	198.9	208.1	197.7	179.9	172.1
	4.	Andal-Haldia-Tuticorin	183.7	157.2	159.9	147.9	138.7	126.9
	5.	Andal-Haldia-Cochin	186.9	158.7	161.7	150.3	137.5	128.8
	6.	Andal-Haldia-Navalakhi	212.3	170.5	179.7	169.3	151.5	143.7
Salt	1.	Tuticorin-Calcutta	186.3	158.7	142.9	-	-	-
	2.	Bhavnagar-Calcutta	207.8	170.7	155.0	-	-	-

There is a significant reduction in resource costs with every assumed change in operating conditions. A reduction in number of days spent in ports to 10.4 and 7.3 reduces resource cost by Rs. 24 and Rs. 36 per tonne of coal respectively. Similarly, an increase in capacity utilisation of vessels from observed rate of 64 per cent to 85 per cent results in reduction of cost by about Rs. 26 per tonne. Resource costs under assumption 5 (col. 8), regarded as the most ideal situation for ports, is expected to reduce cost on an average by about Rs. 57 per tonne, that is, 25 per cent of present cost level. It is thus clear that if assumed operating conditions were to materialise, coastal shipping would become the cheapest transport mode for coal and salt movement, even with existing vessels of 14,000 DWT. Each of these operating conditions, however, presupposes certain inputs in terms of organisational efficiency to improve coastal shipping productivity. Hence, in the final analysis, assumed costs savings on coastal shipping must be compared with savings in rail and road coasts that would result if the same amount of investment were made on development of these later modes.

Table 14.7

Comparison of (Indices) Railway with Coastal Shipping and Road Transport

(Where Railway Base=100)

Commodity	Pairs of Points	Cost per tonne (in rupees) for 1976-77							
		Railway	Road Transport	As per existing situation 1976-77	Under different set of assumption				
					I	II	III	IV	V
1	2	3	4	5	6	7	8	9	10
Coal	1. Andal-Haldia-Tuticorin--Madurai	100.00	102.8	99.3	87.0	88.3	82.7	78.5	73.1
	2. Andal-Haldia Cochin-Shoranpur	100.0	127.5	116.2	104.3	106.1	99.6	92.3	87.5
	3. Andal Haldia-Navalakhi Surendranagar	100.0	100.0	123.2	101.8	106.5	101.2	92.1	88.1
	4. Andal-Halia-Tuticorin	100.0	102.4	89.4	67.1	68.2	63.1	59.2	54.2
	5. Andal-Haldia-Cochin	100.0	126.6	99.9	84.8	86.4	80.3	73.5	68.8
	6. Andal-Haldia-Navalakhi	100.0	101.0	101.5	81.5	85.9	81.0	72.5	68.7
Salt	1. Tuticorn-Calcutta	100.0	115.9	84.1	71.6	64.5	-	-	-
	2. Bhavnagar-Calcutta	100.0	113.6	98,0	80.5	73.1	-	-	-

14.3.5 We also examined cost data from two other studies on shipment of coal by all-rail route vis-a-vis rail-cum sea route. These are : (i) inter-modal study of rail transport and coastal shipping (Planning Commission, 1973) and (ii) techno-economic feasibility study for Bengal Bihar Coal transportation and bulk handling, 1976 (Swan Wooster Engineering Co.) Cost data from these studies are shown in table 14.8. Both studies provide an insight into what can be achieved by coastal shipping if the right inputs in ship size, handling equipment and draft facilities are provided for it. However, these studies, as well as the one by RITES, are not comparable as they have been conducted on varied assumptions and at points of time. The study by RITES is based on existing operating situation and on a ship size of 14,000 DWT. Studies carried out by the Planning Commission and Swan Wooster assumed ships of larger sizes (15,000 DWT and 35000 DWT respectively). The Swan Wooster study also took into account port investments to provide operating drafts and handling facilities corresponding to ship size. These assumptions must be borne in mind while drawing policy conclusions.

Table 14.8

Comparison* of delivered costs/Tonne of coal from Bengal-Bihar Coal Fields to designated ports

(Cost per tonne in Rs.)

	Planning Commission		Swan-Wooster Study (1976)		RITES (1976-77)	
From Bengal Bihar	All rail routes	Rail-cum-sea route via Calcutta 15000 tonne ship size	All rail routes	Rail-cum-sea route via Calcutta 35000 tonne ship size	All rail routes	Rail-cum sea route via Haldia 14000 tonne ship size
1	2	3	4	5	6	7
Madras	35.6	35.4	88.0	75.0	-	-
Tuticorin	61.6	46.2	125.0	107.3	234.3	183.7
Cochin	42.7	44.3			187.1	186.9
CDA	59.5	44.5				
Bombay	38.9	41.4	112.0	99.3		
Kandla	62.5	44.4				

*These cost have been worked under different assumptions.

14.3.6 Both the Planning Commission and Swan Wooster studies show that rail-cum-sea coal movement has a decisive cost advantage over all-movement. But it is not clear from the Planning Commission study what rate of interest and method of depreciation have been used for calculating operating cost. Bunker costs in 1973 were much lower than in 1976-77. Moreover, it is not mentioned whether port charges were taken into account and calculations made were in terms of

financial or resource costs. By contrast in Swan Wooster study, various assumptions made in computing financial costs are clearly stated. This study did not compute resource cost, as costs were computed for coal movement in varying quantities in the following three phases :

(i) from 1975-76 to 1978-79 (phase I)
3.65 m. tonnes per year.

(ii) From 1978-79 to 1980-81 (phase II)
6.80 m. tonnes per year.

(iii) From 1980-81 to 1983-84 (phase III)
14.11 m. tonnes per year.

Rail-cum-sea route costs given in table 14.8 correspond to phase I for Madras and Tuticorin and phase III for Bombay (as coal movement to Bombay is envisaged in phase III only.) These calculations assume rail costs at Rs. 18.80 per tonne from pithead rail station to Calcutta. The ship size assumed is 35,000 DWT with one 15 tonne grab bucket slewing crane per hold, and combined unloading rate of 2,000 tonnes per hour with a matching on-shore equipment at the port of discharge. The study assumes interest rate of 11 per cent for calculating capital cost. Calculations of bunker costs and port charges are at a much lower level than those assumed in the RITES study.

14.3.7 The most significant conclusion to draw from these studies is that, with choice of appropriate ship size of modern vintage and adequate investment in infra-structural inputs, cost of transport by rail-cum-sea route is much lower than by all-rail-route to all nominated ports. It is from this angle that the future of coastal shipping must be viewed if it is to function as a commercially viable element of our transport system. The minimum that should be done to improve operating environment of coastal shipping is outlined in subsequent pages.

14.4 Future of Coastal Shipping
Introduction

14.4.1 Notwithstanding its limitations, coastal shipping can significantly supplement internal transport system, particularly when internal modes are under pressure. Coastal shipping has potential to develop on its own where it caters to a closed circuit, 'merry-go-round' traffic which originates and terminates between ports. However, coastal shipping is presently operating under severe constrainsts which should be removed if it is to be placed on a sound footing. Some constraints can be removed by administrative measures; others require financial investment.

Coordination of Coastal operation

14.4.2 The first essential step to be taken to increase coastal shipping productivity is to bring about proper co-ordination between concerned agencies dealing with coastal trade, including shippers, shipping companies and surface modes of transport. In the absence of any co-ordinating agency, D.G. (Shipping) has to some extent the responsibility for co-ordination. But this will ultimately require an independent operational agency with appropriate powers to co-ordinate and programme coastal traffic.

Modernistation of Coastel Fleet

14.4.3 The second essential step for encouraging growth of coastal shipping is modernisation of age-old fleet. The table below shows age composition of the fleet presently operating on coastal trade :

Table 14.9

Age Composition of Coastal Fleet 1977

Type of Vessels	Age (years)					
	5 and below	6-10	11-15	16-20	Over 29	Total
1	2	3	4	5	6	7
Dry Cargo	10	2	18	8	20	58
Oil tankers	6	-	1	2	-	9
Passenger-cum-cargo	-	2	4	1	3	10
Total Fleet	16	4	23	11	23	77

Twenty three ships (or about 30 per cent) of coastal fleet with a tonnage of 62,300 GRT is already over 20 years old, and having outlived their economic life should be scrapped. Besides, 11 more ships with a tonnage of 55,700 GRT will become obsolete by the end of the Sixth Plan. Thus, more than 27 per cent of coastal tonnage will have to be replaced during the Sixth Plan. Actually ship-owners first do not wish lock up their capital in this business as long as they see no prospect of earning a reasonable rate of return. Nevertheless, it is essential that shipping companies have access to cheap finance on concessional terms for replacing old ships and purchasing new ones if they wish to expand their fleet. Several existing shipping companies have obtained loans from Government or the Shipping Development Fund Committee in the past for replacing old ships. In our judgment this source of finance should continue to be available to them both for replacement of old ships and acquisition of new ones.

14.4.4 We feel that no restriction should be placed on choice of shipping companies in respect of manufacturers from whom vessels for coastal trade are purchased. If companies are required by Government to purchase vessels from domestic manufacterers, care should be taken to ensure that vessel deliveries are made according to schedule. Manufacturers should also develop capacity to design and build ships of modern types to suit requirement of coastal trade, keeping in view draft restrictions at ports.

Freedom of Operation

14.4.5 The existing licensing system operated under section 406 of the Merchant Shipping Act empowers D.G, (Shipping) to restrict movement of Indian ships exclusively to coastal trade at his discretion. It is no doubt desirable to regulate movement of Indian ships on international routes to avoid concentration on lucrative trade routes but we see no logic in precluding any coastal shipping company from shifting vessels to overseas trade if coastal traffic demand is not adequate at a particular time. We, therefore, urge that coastal shipping companies should be free to switch over to overseas trade after fully meeting coastal trade requirements. Indeed, in existing conditions, there is in our view hardly any chance of shipping companies surviving in coastal business alone unless they supplement their earnings through overseas trade or receive Governmment sudsidy. Hence, if minimum tonnage is to be retained in coastal trade in national interest, despite huge operating losses incurred by coastal shipping companies, the only practical way of doing so is to keep operating option in overseas trade open to these companies.

Customs Procedure

14.4.6 A tedious impediment in the way of coastal shipping relates to customs clearance. It is surprising why, after all, coastal trade has to go through this cumbersome and time-consuming process. Not only coastal vessels have to be

cleared by customs: the documentation procedure they have to follow is also the same as for foreign-going vessels. To meet documentation requirements, coastal shipping companies have to set up a section at ports or engage a house-agent for compliance of customs regulations. This adds to the already high operating costs of coastal companies. We recommend that coastal vessels should not be required to go through the same procedure for clearance through customs as foreign-going vessels. If these vessels cannot be exempted from customs regulations, the procedure applicable to them should be at least simplified to save time and cost to them.

Port Facilities

14.4.7 It is estimated that about 70 per cent of ship-time is at present spent at ports and only 30 per cent on the voyage. Much of the time lost at ports is in wating for a berth but a good part is also lost due to slow handling of cargo at berths. If normal conditions prevailed, these same vessels would perform more voyages and the same tonnage carry more coastal cargo.

14.4.8 To place coastal shipping on a sound financial footing, therefore, it is necessary to improve turn-round of ships at ports. Coastal vessels ply mainly between major ports, and it is at these ports that congestion is most acute and berthing a problem. Some coastal ships also call at intermediate and minor ports, particularly for lifting cargo along Gujarat coast. These ports lack modern berthing facilities. Hence, loading and unloading are in midstream with the aid of barges and country craft, which considerably reduce vessel productivity. It is, therefore, essential that modern berths with mechanised facilities should be provided at these ports to improve coastal vessel productivity.

Priority Berths

14.4.9 Development of berthing and modern cargo handling facilities at coastal ports is a long term solution for improvement of ship turn-round. This will have to be pursued as part of an overall port development programme. In the short term, however, it is necessary to provide immediate relief to coastal shipping to reduce unnecessarily long detention to coastal vessels. We suggest that port authorities should reserve special berths, particularly at major ports, for exclusive use of coastal shipping. In our view, preferential treatment to coastal shipping in berth allocation is necessary, because while overseas ships normally have demurrage or despatch clauses in their freight contracts, which protect them against port delays, no such compensatory terms are available to coastal shipping.

Tariff Policy

14.4.10 Section 412 of the Merchant shipping Act, 1958, empowers the Government to fix or revise rates for carriage of cargo and passengers on coastal trade of India. The Government has so far exercised these powers for two commodities, coal and salt, which presently account for over 80 per cent of coastal traffic. In determination of freight rates and other terms and conditions of carriage, a distinction is made between coal moved on railway account and other coal and salt traffic. Carriage of railway coal is on liner terms, while other traffic is carried on FIOT (Free in and out Trimming) basis. Freight rates on other commodities and general cargo are determined through direct negotiation between shipowners and shippers on bilateral commercial basis, though the Indian Coastal Conference prescribes terms and conditions and lays down shipping practices for carriage of cargo, which are generally adhered to by negotiating parties.

14.4.11 The procedure followed by D. G. (Shipping) for revision of freight rates is cumbersome and timeconsuming. Whenever an application is made by the Coastal Conference for revision of freights, D. G. (Shipping) must first analyse the financial performance of its members for a period of time between previous and new revision. D.G (Shipping) then submits results of the analysis together with his recommendations to the Ministry of Shipping and Transport which, in turn, refers it to the Bureau of industrial costs and prices before consulting the committee of secretaries. It is only when all these stages are completed that a final decision is taken. In the process considerable time is lost and operation costs escalate further, rendering revised freight rates once again un-economical to coastal shipping. For example, it was brought to our notice that in july 1975 when freight rates were revised on an application made

about two years earlier, the new rates did not take into account increases in

(i) wages of floating staff with effect from January 1975;

(ii) stevedoring charges which accurred between the date of application and revision;

(iii) coal trimming charges from Rs.7.50 to Rs. 10 per tonne with effect from April, 1975;

(iv) port charges effective from July, 1975; and

(v) bunker costs from january, 1975.

The Indian coastal Conference application for revision of freight rates made in October 1976 is still pending as of date, though cost of operation has since risen considerably.

14.4.12 The unduly long delay involved in revision of freight on coal and salt has led to an anomalous situation under which the Costal Conference tendes to jack up its freight on general cargo and other commodities which to date have been left free by Government from its regulatory control. The anomalies in freight rates can be seen from those for coal, salt and fertilizers from the east to west coast listed below:

	Freight Rs.tonne
Salt	93.50 (includes bunker surcharge)
Coal	105.50 (includes bunker surcharges of Rs.24 per tonne)
Fertilizer	175.00 (includes bunker surcharges of Rs.24 per tonne).

Rates quoted for fertilizers are on FIOT basis, which means that the shipper has to bear stevedoring cost at both ends presently amounting to Rs. 75 per tonne. Thus, the total cost of moving fertilizers by ship works out to Rs 250.00 per tonne, as against Rs.150 for corresponding distance by rail.

14.4.13 Determination of freights and fares for coastal trade raises difficult policy issues. On the hand, we consider it imperative that the principle of fixing fares and freights on the basis of cost of service should be strictly applied to all modes of transport, not excluding coastal shipping so that available resources are utilised optimally in the transport sector. On the other hand, if conditions under which coastal shipping is presently operating remain unchanged, coastal shipping costs are likely to be so high that freights rates will become prohibitive.

14.4.14 Nevertheless, some broad policy guidelines are recommened for coastal tariff. First coastal trade should not be run at loss to shipowners on the presumption that they may cross-subsidise their losses out of earnings on international trade. Such cross-subsidisation is not desirable on grounds of resource allocation or equity. If coastal shipping is be subsidsed on larger socio-economic or strategic factors, subsidy must be in an explicit form and financed directly by the national exchequer. Secondly, shipowners realising fares and freights for coal and salt on their operating costs should be free to do so in consultation with D.G.(Shipping). Thirdly, D.G. (Shipping) should be the final authority for coastal traiff. He should have discretion in negotiating tariff structure with the Coastal Conference without having to refer it to the Ministry of Shipping for final approval. He should use his powers within the broad pricing guideling laid down by the National Transport Commission.

14.5 Government Policy

14.5.1 Growth of coastal shipping on a sound finanical basis calls for a clear and firm policy statement by Government on its future role in the country's transport system. In particular, it is necessary for Government to allot an assured quantity of traffic to coastal trade on a long term basis, taking into account the comparative advantages, so that it may programme for operating an adequate number of ships between desiganted ports on a regular basis. At present, except for a couple of small shipowners, all existing shipping compaines operate mainly in international trade, sparing ships for coastal trade whenever D.G. (Shipping) asks them to do so in his effort to mobilise requisite amount of coastal tonnage. Coastal shipping thus serves as a standby services which is expected to come to supplement

surface modes during emergencies. We feel that such an attitude to coastal shipping is not correct, as it creates an uncertainty about its future role, due to which shipowners are unable to draw up expansion programmes on a rational and realistic basis. Such and ad hoc and short-sighted attitude to coastal shipping has to be given up in favour of a more realtistic and long-term view on its future in the nation's transport system- The potential for coastal trade should also be kept under review and Government should indicate to shipping industry from time to time the tonnage it must provide to meet changing requirements of coastal trade. The proposed National Transport Commission will, of course, be right agency to which this task may be entrusted, as it will have data base to determine its appropriate role in the transport system.

14.5.2 Under the present operating conditions, costs of coastal movement are generally uneconomical and we see little scope for coastal shipping to survive on its own unless it receives Government financial support. There is a distinct possibility for cosatal shipping to become financially viable only when there is a poential for closed circuit, project-oriented movement of coastal traffic in large bulk. Such optential needs to be explored while locating new industries along the coast.

14.5.3 The present practice of subsidising users of coastal shipping for transporting coal by raising funds through sepecific excise duty under the Coalmines Conservation and Development Rules has no rational basis. It is an anachronism which could be abandoned. The original purpose of this duty was to raise funds for conservation and welfare of coalmining areas, and we suggest that these funds should be used for that purpose. However, if coal movement by coastal shipping is to be subsidised, the Government must openly decide on the quantum of this subsidy and pay it directly to coastal shipping, instead of to consignees, who, in that case, would pay to shipping companies at freight rates charged by railways for similar haulages.

14.6 Future Traffic Potential

14.6.1 Some indications are available of future requirements of coastal traffic from shipping interests. The potential for coastal traffic by the turn of the century is placed at 119 lakh originating tonnes. The commodities most likely to dominate coastal trade are coal, cement, fertilizers, foodgrains, salt and timber. General cargo does not seem to have much future in coastal trade, its volume remaining stagnant around 2 lakh tonnes. The table 14.10 shows the expected volume of traffic for 1980-81-2000-2001 A.D. and its commodity composition. The figures for 1980-81 are somewhat firm but those for 2000-2001 A.D. indicate broad orders of magnitude.

Table 14.10

Anticipated Coastal Shipping Traffic 1980-81-2000-2001

Commodity	Estimated Annual Traffic (in 000, tonnes)		Major flows
	1980-81	2000-2001	
1	2	3	4
1. coal			
i) Railways	200	100	From Calcutta Haldia
ii) Power Plants	2,000	3,600	a) to Gujarat state ports, Navalakhi and
iii) Industrial coal	200	800	Bhavnagar and Cochin on the West
Sub-Total	2,400	4,500	coast.
			b) Madras and Tuticorin on the east coast.
2. Cement	1,000	2,500	Tuticorin-Calcutta
3. Feritilizer	500	2,000	Inter-coast and wider coast
4. Foodgrains	500	1,000	Kandla and Kerala state port
5. Salt	350	900	a) Tuticorin-Calcutta b) Saurashtra-Calcutta ports
6. Timber	100	500	Andaman Nicobar Island-Calcutta.
7. General Cargo	200	500	
Total	5,050	11,900	

14.6.2 The future expansion of coastal trade has to be planned with reference to a few selected commodities in which coastal shipping will have a decisive cost advantage. From this point of view we feel that coal, salt, cement and fertilizers will be significant in coastal trade. Some of these commodities are suited for closed circuit, 'merry-go-round' movement such as, for instance, movement of coal to power plants or clinker to cement plant. These possibilities should be fully explored in future in an effort to disperse economic activity and develop an assured market for coastal traffic.

14.6.3 Coal is likely to remain the most important single item of coastal traffic, though, its user composition is likely to change. The railway coal which at present accounts for more than 50 per cent of total coastal traffic will be gradually reduced to 2 lakh tonnes in 1980-81 and further to 1 lakh tonne annually by 2000-2001 A.D. as railways move out of steam traction. But coal demand for thermal power plants is expected to show a phenomenal increase. The Tamil Nadu Electricity Board is expected to step up its demand from the present 120,000 to 180,000 tonnes per month from December 1980 and further to 300,000 tonnes per month by 2000-2001 A.D. Similarly, demand for industrial coal is likely to be stepped up from 2 lakh tonnes in 1980-81 to 8 lakh tonnes annually by the end of the century. A number of new industries are likely to come up in coastal areas with increasing demand for coal as a source of energy.

14.6.4 Cement is another commodity for coastal trade, particularly for Calcutta and the

north eastern region. It is understood that the Tuticorin cement plant is now in a position to despatch about a lakh of tonnes of cement per annum to Calcutta and north the eastern region but due to shortage of coastal shipping tonnage and high costs, this quantum of traffic has not materialised. It is reasonable to expect that with appropriate freight rates, coupled with bulk loading and unloading facilities and development of inland waterways, the demand for cement in the Calcutta-north eastern region can be met from the Tuticorin plant and other cement plants, which are likely to be set up in coastal areas during the next two decades.

14 6.5 At present as many as 16 fertilisers units, with a total annual capacity of about 56 lakh tonnes, are located in coastal areas in close vicinity to ports. In addition, about 7 new units with a total annual capacity of 45 lakh tonnes are under construction or are at the approval stage. Thus, coastal areas will have a potential for fertiliser production of more than 100 lakh tonnes a year in the near future. It is anticipated that, given proper freight structure and requisite investment, about 5 lakhs tonnes of fertilisers can be moved by coastal shipping to meet the growing demand in coastal areas and northern States (through Kandla) in 1980-81 itself. Since the demand for fertilisers is growing fast, coastal traffic in this commodity is anticipated to show a four-fold increase by 2000-2001 A.D.

14.6.6 Foodgrains movement by coastal shipping from Kandla to Kerala ports are under active consideration of the food Corporation of India. A Committee on Development of Export and Import has suggested that by 1980-81 about 5 lakh tonnes of foodgrains annually will have to be moved from the north zone to Kerala via Kandla to Kerala ports. It will not be off the mark if we assume foodgrains traffic by coastal shipping to double by the end of the century in line with Government policy of developing storage capacity at consuming centres.

14.6.7 We understand that there is already demand for salt movement from Gujarat and Tuticorin ports to Calcutta. The present coastal tonnage is far from adequate to meet this demand. Salt traffic is expected to rise to 3.5 lakh tonnes in 1980-81. Since industrial use of salt is increasing year by year, an estimate of 9 lakh tonnes per annum as a potential for coastal salt movement by the turn of the century may indeed be conservative. As salt is carried as return cargo by ships carrying coal from Bihar-Bengal regions, it will be necessary to ensure adequate availability of salt at Gujarat and Tuticorin ports, so that movement of ships in ballast to Calcutta and Haldia is avoided.

14.6 8 We understand that Calcutta has substantial demand for Andaman timber but for want of shipping space this traffic has not grown to expected level. Given adequate shipping space and proper freight rates, traffic in this commodity may increase to 1 lakh tonne in 1980 81. Since Andaman has a great potential for timber development and there is an acute timber shortage in the mainland, timber traffic is expected to show a five-fold increase by 2000-2001 A D.

14.7 Sailing Vessel

14.7.1 The continuation of sailing vessels on our coastal trade is desirable from the point of view of both energy conservation and employment potential. Neither the purchase of sailing vessels nor building basic infra-structure like bunders and jetties requires large capital expenditure. Actually, these vessels may provide an impetus to development of minor ports, and we recommend that suitable financial incentives be provided to operators to enable them to revive trade activity at these ports.

14.8 Passenger traffic

14.8.1 We do not see any future for passenger traffic by coastal shipping, except for tourism on selected routes. To capture this market, however, it will be essential to undertake market surveys and organise it on commercial lines. We suggest that economic feasibility studies be made of this potential on certain routes like Bombay-Goa.

14.8.2 There is, however, special need for providing steamer service between the mainland and Andaman Nicobar and Lakshadweep groups of islands. A special case also exists for operating inter-island passenger service within each of these island groups for mobility of people. Presently, the Shipping Corporation of India is operating services between mainland and islands at a loss.

The inter-island services are mainly operated by Government departments but these also run at a loss. We recommend that, in view of difficulties involved in organising steamer services to these groups of islands, a direct exchequer subsidy be provided to operators to cover their costs.

14.9 **Summing Up**

14.9.1 Looking at the comparative economics of coastal shipping, particularly in its existing operating conditions, we do not find that this mode will be important in the country's integrated transport system In our view, the future of coasal shipping lies mainly in catering to project-oriented traffic, involving close-circuit, 'merry-go-round' movement, like transport of coal to power plants or clinkers to cement plants. Coastal shipping in such cases can cater to traffic without any need for subsidisation. Given suitable conditions, it can relieve pressures on inland transport to a substantial extent. However, if traffic is to be carried from inland sources to ports for loading into ships, the economics of coastal shipping will depend critically upon availability of cargo at berths on arrival of ships and a close co-ordination in inland movement. Coal loading at Haldia has suffered despite the installation in 1978 of an automatic coal-handling plant with a rated capacity of 30,000 tonnes per day. The coal dump at Haldia is not satisfactorily maintained due to lack of co-ordination and inadeqacy of internal transport. The operation of this dump must be improved to increase the turn-round of coastal vessels at Haldia.

14.9.2 We also find that operation of coastal shipping as an essential adjunct to internal transport will have to be subsidised. The subsidy should in that case be paid by the national exchequre directly to shipowners, instead of the present practice of paying it to consignees by levying a special excise duty on coal. We also emphasize the need for allotting to coastal shipowners an assured quantum of traffic on a long term basis to enable them to programme for an appropriate number of vessels for operation between designated ports.

14.9.3 In conclusion it is necessary to emphasise the need for simplification and rationalisation of the procedure followed for fixation of coastal tariff. We have recommended that the Indian coastal conference should negotiate freights and fares directly with the Director General (Shipping) who should be the final authority. This will obviate the present cumbersome practice of referring the matter to the Ministry of Shipping and Transport, which involves protracted negotiation. The Director General (Shipping) will, of course, use his powers within the broad pricing framework laid down by the National Transport commission proposed by us.

Chapter 15

Inland Water Transport

15.1 Introduction

15.1.1 Inland water transport (IWT) is the cheapest mode for certain kinds of traffic, both over long and short distances, provided the points of origin and destination are located on water front and no transhipment is involved. We have also observed in Chapter 3 that IWT is one of the most efficient modes of transport from the point of energy consumption. Our calculations indicate that a barge of 1,500 tonne capacity is more energy efficient than diesel traction on rail although still less efficient than electric traction.

15.1.2 IWT has other inherent advantages as well. First, wherever navigable waters exist, this mode can provide immediate accessibility to people of the area, without requiring investment in line haul capacities as in other modes of transport. Investment has, of course, to be made in vessels and in improvement and maintenance of navigable channels and terminal facilities which, however, will not be of considerable magnitude.

15.1.3 Secondly, IWT is a very labour intensive mode of transport. As we have seen in Chapter 3, it generates more employment per rupee of investment than any other mode and that too to benefit primarily weaker sections of community for whom this may be the only source of empolyment.

15.1.4 Notwithstanding these advantages, IWT has gradually declined in its importance and in some parts of the country it is on the point of extinction. The decline in its importance is not only due to lack of investment in essential infrastructural facilities. This mode has some inherent disadvantages which are also responsible for its stagnation. The main disadvantage is its slow movement. Even for such categories of freight and passenger traffic which have no particular preference for quick movement, the comparative cost advantage of IWT is more than offset by the time taken from the point of origin to destination. Secondly, it has a limited spatial accessibility, as navigable waterways are confined to speciffic region. Thirdly, it is only at locations actually situated on waterways that there is direct point-to-point accessibility, without transhipment and further movement by other modes adding to total transport costs. Finally, IWT is not available for navigation throughout the year. With the withdrawal of large supplies of water for irrigation, the time period for which rivers are navigable as well as length of their navigable stretches are reduced. As a result of these disadvantages IWT has had to give place to rail and road transport.

15.2 Histoiical Background

15.2.1 The commercial history of India gives a glorious account of growth of navigation on inland waterways. The location of a large number of towns on waterways, which were also centres of trade and commerce, much before railways, indicate the value of this mode in the past.

15.2.2 The era of mechanical propulsion in India started in 1823 when the first propelled craft - Diana - weighing 89 tonnes, sailed with passengers from Kulpi road to Calcutta, a distance of 80 kms on the Hooghly. In 1834, a regular monthly steamer service was established between Calcutta and stations upstream on the Ganga for carrying the East India Company's officials and stores. In 1842, a regular fortnightly service grew up between Calcutta and Agra on the river Yamuna. By 1863, regular steamer service commenced between Calcutta and Assam. A network of steamer services soon developed extending as far as Garh-Mukteshwar on the river Ganga in Uttar Pradesh, about 645 kms from Allahabad, and Ayodhya on the river Ghagra, about 325 kms. at its confluence with the Ganga.

15.2.3 In the 19th century navigation by power crafts and country boats played a dominant role in development of trade and commerce along river banks and catchment areas of the navigable river and canal system. Bulk of traffic was, however, carried in country boats plying from Delhi and Nepal border to Assam. At its peak in 1876-77 country boat traffic registerd at Calcutta was about 180,000 cargo boats, at Hooghly 124,000 cargo boats, and at Patna about 62,000 cargo boats.[1]

15.2.4 The advent of railways and extension of its network marked a turning point for water-transport in India. To start with, construction of main railway lines gave a spurt to river traffic as the two modes supplemented each other, with waterways providing feeder service to railways. This complementarity between IWT and railways was, however, short-lived. The decline of navigation started by about 1860. By that time extension of East Indian Railways had begun to make itself felt. With an increase in rail network new centres of economic activity away from waterways developed. Gradually, IWT lost its superiority.

15.2.5 The phenomenal growth of road transport, particularly after World War II, gave a decisive setback to IWT. With opening of roads in every nook and corner of the country, old and new centres of industry, trade and commerce were provided with direct accessibility. New industries began to be established in the vicinity of road network. Truck transportation, in view of its advantage of speed, reliability, flexibility and door to-door service, had decisive cost advantage over IWT, even for those industrial centres which were located on water fronts. The survival of IWT as a commercially viable mode of transport became increasingly doubtful in the face of competition from two powerful rivals, railways and road transport.

15.2.6 While competition from rail and road transport was an important factor in the decline of IWT, this mode lost its competitive edge because of diversion of waters from rivers for irrigation, deforestation of hilly ranges leading to erosion and accumulation of silt in rivers and neglect in maintenance of waterway channels. Consequently, there was a reduction in the length of navigational waterways. In addition, inadequate attention was paid to modernisation of fleet and to research and development in vessel design to suit local conditions.

15.2.7 However, IWT continues to be functionally important in regions in which it enjoys natural advantages, as on the Brahmaputra and the Ganga in eastern and north eastern regions of India, Kerala, Goa, and in the deltas of Krishna and Godavari. Until the early 'sixties, river routes such as Calcutta-Assam, Calcutta-Cachar and Calcutta-Bangladesh, had seen flourishing trade in IWT. It is estimated that about 80 per cent of traffic in tea, 90 per cent in raw jute, and a considerable quantity of POL was carried by IWT vessels between Assam and Calcutta. There was also sufficient traffic in the opposite direction. Though inland waterways have an imporant place in Goa and Kerala, examples of viable trade in IWT are few and far between, and it would be no exaggeration to say that this mode of transport is now almost extinct in the country.

15.3 Present Status

Navigable Waterways and National Transport Network

15.3.1 Navigable waterways are confined to only a few States in India and are location specific. The share of inland waterways in the country's network, comprising roads, railways, coastal shipping and inland waterways, is 1 per cent and the density per 100 sq. km. of area 0.44. The low density of inland water transport itself reveals that inland water transport has limited use in transport system of the country.

15.3.2 India's navigable inland waterways extend nearly 14,500 kms. comprising a variety of river systems, canals, backwaters, creeks and tidal inlets. State-wise breakup of navigable waterways is given in table 15.1.

1. Central Water and Power Commission, Navigable Waterways of India, 1961.

Table 15.1

Navigable Waterways in India

State	Nevigable Waterways* in kms			Density of Navigable Waterways (per 100 sq. kms. of area)
	Rivers	Canals	Total	
1	2	3	4	5
Andhra Pradesh	3,09	1,690	1.999	0.72
Asssam	1,983	—	1,983	2.53
Bihar	937	325	1,262	0.73
Goa, Daman & Diu	317	25	342	9.00
Gujarat	286	—	286	0.15
Jammu & Kashmir	200	—	200	0.09
Karnataka	284	160	444	0.23
Kerala	840	708	1,548	3.98
Maharashtra	501	—	501	0.16
Orissa	761	224	985	0.63
Tamil Nadu	—	216	216	0.17
Uttar Pradesh	2,268	173	2,441	0.83
West Bengal	1,555	782	2,337	2.66
ALL INDIA TOTAL :	10,241	4,303	14,544	0.44

Source : Government of India, Ministry of Shipping & Transport, Report of the Committee on National Waterways, 1974, p. 58.

*These include all waterways navigable by country boats.

The greatest potential for IWT exists in Uttar Pradesh, followed by West Bengal, Andhra Pradesh and Assam. Uttar Pradesh and West Bengal have the largest river network, and Andhra Pradesh the largest canal syytem. Navigable waterways of Assam are entirely of rivers. The same is true of Gujarat and Jammu and Kashmir. IWT potential of Kerala is equally split between river and canal system. Goa compared to its area has the largest network of waterways and has the greatest potential for IWT.

15.3.3 Most waterways, however, suffer from navigational hazards like shallow water and narrow width during dry weather, siltation and bank erosion. Moreover, vertical and horizontal clearance at a large number of overhead structures is not adequate for navigation throughout the year. Consequently, at present, about half the river length, that is, 5,200 kms of major rivers and 485 kms of canals, are suitable for mechanised crafts. The important navigable river systems and the extent to which these are navigable by boats and steamers are shown in table 15.2.

Table 15.2

Navigable Length of Important River Systems in India

(In kms)

River Systems	Navigable length	
	By Boats	By Steamers
1	2	3
1. Ganga River System (excluding Hoogly)	3,355	853
2. Brahmaputra River System	1,020	747
3. Rivers of West Begal	961	784
4. Rivers of Orissa	438	42
5. Godavari River System	3,999	—
6. Krishna River	101	—
7. Narmada River	177	48
8. Tapi River	24	24
Total :	6,475	2,498

Source : Central Water and Power Commission, Navigable Waterways of India, New Delhi, 1960,

All navigable waterways presently lack navigational aids and terminal and communication facilities for development of IWT.

Nature of Operations

15.3.4 IWT operations are dominated by country boats. These operations are essentially in the nature of ferry services. No serious and systematic attempt has so far been made to enumerate the number of country boats or volume of traffic carried by them. This accounts for lack of published data on traffic carried by IWT.

15.3.5. Mechanised operations are confined to a few specific locations. Most services offered are again in the form of passenger ferries. Goods operations in an organised manner are confined to West Bengal, Assam, parts of north eastern region, and in Goa to transportation of iron ore from mining areas to waiting ships. There is again lack of information on the size of these operations and volume of traffic.

15.3.6 Available data fot vessel registrations for 1976-77 are indicated in table 15.3.

Table 15.3

Inland Water Vessels Registered with State and Central Authority—1976-77

STATES	Number by type of vessels registered						
	Self propelled		Tugs & pushers	Non-self propelled	Fishing Boats	Country Boats	Others
	Cargo	Passenger					
1	2	3	4	5	6	7	8
Andhra Pradesh	168	NA	NA	16	NA	1,619	115
Assam	9	44	3	10	NA	NA	NA
Bihar	NA	18	4	8	NA	NA	NA
Karnataka	1	14	-	NA	NA	145	151
Kerala	NA	11	NA	NA	NA	NA	NA
Gujarat	NA	—	NA	NA	NA	1,303	NA
Maharashtra	1	40	NA	12	15	337	345
Orissa	NA	10	NA	NA	NA	NA	NA
Tamil Nadu	NA	NA	NA	NA	NA	359	NA
Uttar Pradesh	NA	10	NA	NA	NA	110	NA
West Bengal	NA	631	NA	NA	NA	NA	NA
Goa, Daman & Diu	37	75	4	NA	NA	5,533	NA
Andaman & Nicobar Islands	8	4	2	2	NA	11	2
CIWTC	10	-	18	58	NA	16	16
TOTAL :	234	857	31	106	15	9,433	629

Source : Ministry of Shipping & Transport (Directorate of Transport Research).

N.A. : Not available.

Traffic carried : Ferry Services

15.3.7 Some information on passengers and freight carried by certain public undertakings engaged in ferry services in Kerala, Maharashtra, Assam and Goa are presented in table 15.4.

Table 15.4

Annual Ferry Traffic in 1976-77

(Estimated annual traffic)

Name of the undertakings	Number of passengers carried ('000)	Cargo (in tonnes)	Live-stock (number)
1	2	3	4
Kerala State Road Transport Corporation	10.642	NA	NA
Maharashtra*			
Greater Bombay	11,132	14,100	NA
Thane	1,737	56,713	NA
Kulaba	2,273	71,435	NA
Ratnagiri	3,444	21,570	NA
Assam IWT (in 1973-74)	1,674	9,849	6,400
Government of Goa, Daman & Diu River Navigation Deptt.	5,851	NA	NA

* Figures do not include passenger traffic being handled across rivers in other 22 districts of the State.

It will be seen that there is significant passenger traffic in ferry trade in Kerala and Maharashtra. Data for Maharashtra and Assam also show some business in freight. With the construction of bridges across rivers and extension of bus services, however, there has been a marked shift in traffic from ferry to road transport. This accounts for decline in ferry trade in most States.

Regional Traffic

15.3.8 No accurate estimate of traffic carried on non-ferry trade is available. However cargo carried by public sector undertakings and large private operators by mechanised vessels in 1976-77 is presented below :

Traffic Zone	Commodity composition	Tonne carried ('000)	Tonne-Kms (in '000)
1	2	3	4
Assam	Tea	2.8	3,927
	Timber	0.6	443
Calcutta	General cargo	10.9	8,984
	Iron billets	1 6	672
	Jute	11.4	8,634
	Furnace	161 8	16,662
Goa	Iron ore	3,924.0	176,580
	Sea sand	254.0	7,620
Gujarat	Sea sand	516.0	12,530
	Cement	87.0	1,740
Maharashtra	General cargo	100.0	NA
	Ore	330.0	NA
Kerala*	General cargo	380.0	NA

Source : Ministry of Transport and Shipping (Directorate of Transport Research), New Delhi.

*Kerala State Government.

Goa accounts for the largest proportion of total originating traffic, bulk of which consists of iron ore which moves along the river from mining areas to waiting ships. Traffic in Kerala consists mostly of clay and sand, coir, bricks, tiles and fertilizers.

15.3.4 Trends in freight carried by IWT in the north east region and Tamil Nadu (for which data are available) are shown in table 15.5.

Table 15.5

Trends in Freight Traffic in the North-Eastern Region and Tamil Nadu

(In '000 tonnes)

	FREIGHT CARRIED						
	1951	1961	1971	1975-76	1976-77	1977-78	1978-79
1	2	3	4	5	6	7	8
CIWTC Operations							
N.E. Region vis-a-vis Calcutta and Bangladesh	770.0	725.0	31.0	80.0	178.2	177.7	206.1
I. W.T. Gauhati							
(i) Intra-regional movement	—	—	—	1.5	18.7	NA	NA
(ii) Assam-Bangladesh (Both ways)	—	—	—	0.2	5.8	NA	NA
Tamil Nadu	NA	NA	153.5	128.6	111.1	95.1	NA

Source : CIWTC, IWT Gauhati and Government of Tamil Nadu.

IWT traffic in the north east region, which stood at 7.7 lakh tonnes in 1951, declined sharply to 2 lakh tonnes in 1978-79. Traffic had practically disappeared immediately after 1971 but has since picked up. Traffic in Tamil Nadu has continuously declined from little over 1.5 lakh tonnes in 1971 to 95,000 tonnes in 1977-78.

15.4 **Economics of Inland Water Transport**

Cost Comparison

15.4.1 Comparative cost advantage of IWT should be assessed on the basis of its resource cost. Such comparison is made between IWT, rail and road transport in the following paragraphs. Data on operator costs for movement of coal and fertilizers by rail and road is obtained from RITES. IWT costs were worked out by the Transport Policy Planning Project (TPPP) in the Planning Commission for different sizes of flotilla, both self-propelled and tug-barge towing operations. The cost estimates worked out by RITES include both operator and user costs but IWT estimates are available for operator costs alone. To make cost comparison we have relied only upon operator cost estimates.

15.4.2 In estimating economic costs for an operator an almost identical methodology has been used by RITES and TPPP. The only exceptions are :

(a) operating costs for rail and road provided by RITES are based on 1976-77 prices and IWT costs on current (1979) prices, and

(b) fuel (HSD) component of rail and road operating costs after adjusting for a pre-

mium of 25 per cent on c.i.f. prices (in 1976-77), is taken at Rs. 1.31 per litre. Against this diesel price used for computing IWT costs at 1979 rate is Rs. 1.50 per litre.

IWT operating cost also includes cost incurred at terminals.

15.4.3 TPPP study on IWT operator costs also throws light on economics of size at 500 tonnes, 1,000 tonnes and 1,500 tonnes capacity of operating unit and economics of tug-barge towing operations compared to self-propelled operating units.*

15.4.4 In addition to TPPP estimate of IWT operator costs, estimates have been made earlier by consultancy agencies while preparing detailed project reports (DPR) for specific IWT projects. Two such estimates relate to : (a) Ulhas River-Thane Creek waterway (Bombay) and (b) Ganga river (Allahabad) projects. These estimates are essentially based on financial costs. With regard to the first, project costs have been calculated separately by NCAER (1974)[2] and by TECS (1978)[3]. These estimates differ sharply as they were made at different points of time and under different assumptions. Furthermore, coverage of cost components also varies. For example, TECS study includes terminal costs which have not been considerd in NCAER study.

15.4.5 Cost computation for the Ganga River Project was made by NCAER based on 1975-76 prices for different types of flotilla, namely, 100-tonne and 300-tonne self-propelled barge, one-tug and 3 dumb barges of 100 tonnes each-one tug and 4 dumb barges of 125 tonnes each, and one tug and 6 dumb barges of 100 tonnes each. The study assumes capital expenditure varying from Rs. 3.35 lakh to Rs. 41.5 lakh per flotilla, a crew of 10 to 22 persons, speed ranging from 10 to 14 km-hr., with a working day of 10 hours, a trip distance of 1,400 kms. and with load factor ranging from 50 to 100 per cent. Fuel consumption assumed is 50 to 70 litres per hour depending on carrying capacity of flotilla. This study is again not comparable with any study referred to earlier.

15.4.6 Results of studies on IWT operating costs are shown in table 15.6. The first salient point to note is that there are sizeable economics of scale in barge operations. The unit cost of operation decreases with an increase in the size of an operating unit. Both NCAER and TPPP studies are revealing. For example, in TPPP Study, unit cost for 50 km distance operations by 500 tonne barge is 11.3 paise per tonne-km. It falls to 8.7 paise per tonne-km for 1,000 tonne barge and further to 8.1 paise per tonne-km for 1,500 tonne unit. This is true for each type of flotilla, that is, self-propelled barge as well as tug-barge operations. Secondly, unit cost per tonne km is lower for successive increase in distance zone of operation. To be precise long distance operations are comparatively cheaper than short distance ones. For example, TPPP study shows that 1,000 tonne self-propelled barge operating costs for 50 km distance is 8.7 paise per tonne-km, as against 5.4 paise per tonne-km for 100 kms distance and 3.3 paise per tonne-km for 300 kms distance operations.

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* Detailed assumptions and cost computations are given in annexures 15.1 and 15.2 respectively.

2. National Council of Applied Economic Research (NCAER), Traffic and Economic Survey of Ulhas River-Thane Creek-Bassein Creek Waterways, 1974.

3. Tata Economic Consultancy Service, (TECS) –An Economic Feasibility Report on the Proposed Thane Creek—Ulhas River Inland Waterway Project, 1978.

Table 15.6

IWT Operating Costs Comparison

(Cost in paise/tonne-km)

Flotilla size	Cost estimate by						
	NCAER		TECS		TPPP		
	Ulhas (1973-74 Prices)	Ganga (1975-76 Prices)	Ulhas (1977-78 Prices)			Global (1979 Prices) Cost	
			Distance slab in kms	Cost	Distance slab in kms	at 100 per cent load factor	at 75 per cent load factor
1	2	3	4	5	6	7	8
100 tonne self propelled	—	51					
300 tonne self propelled	—	20					
500 tonne self propelled	11				50	11.3	13.7
					100	7.3	9.1
					300	4.7	6.1
1000 tonne self propelled	8.4				50	8.7	10.3
					100	5.4	6.5
					300	3.3	4.1
1500 tonne self propelled	—	—	—	—	50	8.1	9.4
					100	4.8	5.8
					300	2.8	3.4
1 tug+3 barges of 100 tonnes each	—	15	—	—	—	—	—
1 tug+4 barges of 125 tonnes each	—	12	—	—	50	10.1	12.2
					100	7.2	9.0
					300	5.4	6.9
1 tug+6 barges of 100 tonnes each	—	11	—	—	—	—	—
1 tug+5 barges of 200 tonnes each	—	5.8	—	—	50	7.7	8.9
					100	5.1	6.8
					300	3.5	4.4
1 tug+10 barges*	—	—	24	20.0			
			40	18.5			
			60	18.5			
1 tug+6 barges of 250 tonnes each					50	7.3	8.5
					100	4.7	5.6
					300	3.1	3.9

* Capacity is not known.

15.4.7 It may be seen from table 15.6 that for a combination of tug-barge operations vis-a-vis self-propelled barge operations, the TPPP study shows that tug barge operations are economical on 50 and 100 km distance leads than self-propelled barges, but these economies disappear if distance lead increased to 300 kms. This is due to low output* of tug-barge operations at a lead of 300 kms as compared to self-propelled barge. Table 15.7 shows output ratios per tug-barge operations at different distance slabs and also ratio of investment cost of self-propelled barge to tug-barge units.

Table 15.7

Tug-Barge Operations

Output and Investment Cost Ratios

Flotilla capacity (tonnes)	Tug-Barge Vs Self Propelled Unit Investment: Performance ratio at different slabs			Investment Cost Ratio
	50 kms	200kms	300kms	
1	2	3	4	5
500	1.8	1.5	1.7	1.4
1000	1.8	1.5	1 2	1.3
1500	1.9	1.6	1.3	1.5

Inter-modal comparison

15.4.8 Inter-modal cost comparison based on RITES cost data for rail and road and TPPP cost data on IWT for self-propelled barges is presented in table 15.8.

Table 15.8

Resource Cost Comparison : Operating Cost by Railways Road Transport and Inland Waterways

(Cost in paise per tonne-km)

Distance (in kms)	Railways (Diesel traction Single line operation-Wagon load movement		Road Transport		Inland Water Transport (for self-propelled vessels/capacity at 75 per cent load factor)		
	Coal	Fertilizer	Coal	Fertilizer	500 tonne	1000 tonne	1500 tonne
1	2	3	4	5	6	7	8
50	23.6	23.4	27.0	35.0	13.7	10.3	9.4
100	14.6	14.3	21.0	17.4	9.1	6.5	5.8
300	8.6	8.4	15.0	19.0	6.1	4.1	3.4

* Output levels for each type of flotilla based on average speed and waiting time per round voyage is given in annexure 15.3

It is Will be seen that cost of operation of IWT, computed for a 500-tonne self-propelled unit, working at 75 per cent of its capacity for 300 days a year, is lower than rail and road transport costs, its cost advantage over rail and road becoming more pronounced for large size vessels. For larger sizes of operating units, IWT operating costs are less than half of rail and less than one-third of road costs. Even the highest cost estimates for IWT,computed by TECS,ranging from 20 paise for a distance slab of 24 kms to 18.5 paise for 60 kms per tonne-km, are the lowest for short-haul operations.

15.4.9 The extent of gain in operating costs offered by IWT over railway operating costs (as an example for fertilizer movement) is given in table 15.9.

Table 15.9

Savings in IWT Costs Vis-a-Vis Rail Operating Costs-Fertilizer

(in paise/per tonne-km)

Distance (in km)	500 tonne capacity unit	1000 tonne capacity unit	1500 tonne capacity unit
1	2	3	4
50	9.7	13.1	14.0
100	5.2	7.8	8.5
300	2.3	4.3	5.0

Inter-modal cost comparison clearly shows that IWT has cost advantage over rail and road for direct movement of cargo, that is, from one terminal to another on water front. Cost comparison is attempted by further taking into consideration multi-modal movement and additional transhipment costs for IWT for surface transport. Table 15.10 presents IWT operating costs, including those of transport and transhipment involved in cargo movement by road over varying distauces. It may be seen that small size, 500-tonne barge-operations lose their cost advantage over rail where transhipment is involved. Large-size barge operations (for example, of 1,000 and 1,500 tonnes capacity), however, maintain cost advantage over rail, while covering transhipment costs, involving additional road journeys up to 15-30 kms distances to and from IWT terminals. Cost advantage of IWT over road transport is, however, prominent throughout. The break-even distance for additional surface road journey, a small size barge of 500 tonne can bear is 50 kms for a 50 kms distance slab on waterways operations. The break-even distance is, however, longer when IWT operations are extended to 100 kms and 300 kms distance-zones.

Table 15.10

IWT Operating Costs Including Overland Transport Costs at Varying Distances

(Cost in paise/tonne-km)

Size of the Operating Unit	IwT Operational Lead (in km)	Overland Distances (in kms.)									
		5	10	15	20	25	30	35	40	45	50
1	2	3	4	5	6	7	8	9	10	11	12
500 tonne	50	23.3	25.4	27.2	28.7	30.1	31.2	32.3	33.2	34.0	34.7
capacity	100	14.0	15.4	16.7	17.8	18.8	19.8	20.7	21.5	22.3	23.1
Self Propelled Barge	300	7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.2	11.6	12.1
1000 tonne	50	19.8	21.9	23.7	25.3	26.6	27.8	28.8	30.7	30.5	31.3
capacity	100	11.5	12.9	14.2	15.3	16.3	17.3	18.2	19.0	19.8	20.5
Self Propelled Barge	300	5.8	6.4	6.9	7.4	7.9	8.4	8.8	9.3	9.7	10.1
1500 tonne	50	19.0	21.1	22.9	24.4	25.7	26.4	27.9	28.8	29.7	30.4
capacity	100	10.8	12.2	13.4	14.6	15.6	16.6	17.5	18.3	19.1	19.8
Self propelled Barge	300	5.2	5.7	6.2	6.7	7.2	7.6	8.1	8.6	9.0	9.4

15.5 Future of Inland Water Transport

Background

15.5.1 Notwithstanding its limitations, IWT has an important function in regions with considerable length of navigable waterways. It also has a potential to develop on its own where it caters to traffic which originates and terminates between places located on water-front. It also has potential in areas served by circuitous roads involving comparatively longer distances than waterways and longer rail routes, particularly when transhipment is involved due to gauge conversion. However, IWT is presently operating under severe operational constraints which need to be removed if river transport is to be revived.

15.5.2 The problems of IWT were studied in the past by several technical experts, study groups and official committees like the Estimate Committee of parliament (1956-57), the Gokhale Committee on Inland Water Transport (1959), the Committee on Transport Policy and Co-ordination (1966), the Estimates Committee (1968-69), the Bhagavati Committee on Inland Water Transport (1970) and the Committee on National Waterways (1974). Several committies have also gone into the working of the Central Inland Water Transport Corporation (CIWTC) and have made recommendations interalia on development of IWT. These committees considered difficulties and problems of river transport and expressed the view that IWT should form part of the national transport and recommended measures, technical, organisational and financial, to develop it. The Gokhale Committee prepared detailed integrated schemes for all States at an estimated outlay of about Rs. 168 crores. These schemes included hydrographic

surveys, conservancy measures, including dredging, terminal facilities, approach roads to ghats and jetties, navigational aids, ship repair facilities, establishment of a central organisational and training facilities. The Bhagavati Committee suggested that development of land water transport should not be viewed from the angle of commercial viability alone. Benefits to the economy and people at large are equally important considerations. The Committee recommended schemes estimated to cost Rs. 28 crores phased over a period of 10 years. Having realised financial and other problems faced by State Governments, the Committee stressed the need to make a break-through from existing neglected state of development by more active participation by the Central Government The Committee also endorsed the views of the Estimate Committee and the Gokhale Committee and recommended declaration of certain waterways as national waterways.

Inland Water Transport and Five Year Plan

15.5 3 Development of IWT as a part of economic development plan was initiated in the Second Plan (1956-61) Since then a total provision of Rs. 64 crores was made for IWT until the Fifth Plan, of which about Rs. 34 crores have been spent. In the 1978-83 plan Rs. 43 crores were allocated to give fresh impetus and encouragement to IWT, Rs. 31 crores in Central and Rs. 12 crores in State sector programmes The overall approach of Government is to move in selectively, taking up only specific schemes of known potential for development under the Central sector, other schemes the economic viability of which has been judged by individual States being included in their respective State plans.

Constitutional Responsibility for Inland Waterways

15.5.4 Inland water has been defined in section 2(2) of the Indian Steam Vessels Aet, 1917, as "any canal, river, lake or other navigable water". With the introduction of mechanical propulsion in the country, a number of enactments were passed to regulate traffic. These enactments were later consolidated and the Indian Steam Vessels Aet passed in 1917.

15.5.5 Under the provisions of Government of India Act, 1935, "inland waterways and the traffic thereon", was the responsibility of provincial Governments but "shipping and navigation on inland waterways as regards mechanically propelled vessels and the rule of the road on such waterways; carriage of passengers and goods on inland waterways" was a subject for concurrent legislation. The Government of India Act 1935, however, did not visualise either "national highways or "national waterways". The term "national waterways" appears in entry 24 of List I of the 7th Schedule of the Constitution of India, although this term as such has not been defined.

15.5.6 Constitutional provisions show that the Central Government has responsibility to frame rules for carriage of passengers and goods by mechanically propelled vessels, including road rules to be observed by power-driven vessels on sueh waterways.

15.5.7 The constitutional position with regard to navigable waterways, particularly national waterways, needs to be amended to bring them for all practical purposes under one unified control. This will enable the Central Government to frame a national poliey of conservancy and maintenance of waterways as a basic infra-structure for IWT.

National Waterways

15.5.8 The need for introduction of concept of national waterways in conformity with objectives of "national highways" in India has been suggested to us by various State Governments. Due to financial stringency and poor plan outlays State Governments have not been able to take adequate measures for river and canal conservancy. Consequently, navigation has become hazardous and some waterways fallen into disuse. It is our considered opinion that declaration of certain important rivers as national waterways will help unified development for navigational purposes.

15.5.9 The issue of national waterways was earlier examined by various committees. The consensus is that important waterways be declared as national waterways. In principle, Government has accepted the recommendations for declaration of speeific waterways as national waterways. However, no decision has been taken so far on criteria to be adopted for it. After examining criteria suggested by various committees and other bodies we recommend the following principles for declaration of a particular waterway as a national waterway :

(a) It should possess capability of navigation by mechanically propelled vessels of a reasonable size.

(b) It should have about 45 metre wide channel and minimum 1.5 metre depth.

(c) It should be a continuous stretch of 50 kms, the only exception to be made to waterway length is for urban conglomerations and intra-port traffic.

(d) (i) It should pass through and serve the interest of more than one State, or

(ii) it should connect a vast and prosperous hinterland and major ports, or

(iii) it should pass through a strategic region where development of navigation is considered necessary to provide logistic support for national security, or

(iv) it should connect places not served by any other mode of transport.

We are of the view that future traffic potential for waterways must be assessed. The amount of traffic presently carried need not be given undue weightage at this stage. Traffic growth will depend on development of infrastructure and industrial locational policy pursued by the State and Central Government.

15.5.10 In our opinion the following waterways (shown in Map 15.1) meet criteria for declaration as national waterways :

i) The Ganga-Baghirathi-Hooghly,

ii) The Brahmputra,

iii) The Sunderbans,

iv) The Narmada,

v) The Mahanadi,

vi) The Tapi,

vii) The Godavari,

viii) The Krishna,

ix) The Cumovi and Zuvari rivers and the Mandbaraguva canal in Goa,

x) The West Coast Canal System in Kerala.

Conservancy Policy

15.5.11 The basic reason for decline in navigability of inland waterways is neglect of maintenance and conservancy measures in all navigable States in India. The maintenance of a river channel is all the more important when major navigable waterways are situated in tropical regions with two distinct seasons, monsoon with heavy rainfall and dry weather. During the monsoon heavy rains bring vast volumes of water from tributory streams to the parent river. Uncontrolled, the enormous energy of rivers in floods spend itself in eroding river banks, widening its bed and often devouring cultivated farmlands, rail, roads and homesteads. After each monsoon the river commences to fall and gradually the water level becomes so low (below one metre) that it creates draft problems for mechanised operations. The seasonal variation in water level on major rivers in many cases is of the order of ten metres. Wide fluctuations in water level from monsoon period to dry weather cause serious navigational problems due to bank erosion, siltation, instability and deterioration of channels and disruption of loading and unloading facilities. At present there is hardly any sizeable length of waterways providing uninterrupted navigation throughout the year. Most waterways are not navigable, at least for three to four months a year.

15.5.12 The Committee on National Waterways has observed that in the absence of river training works rivers form several braided channels which are generally too shallow for navigation. As a result navigation has to follow capricious ways of the river, turbulent during floods, and placid but shallow to the point of no navigation low water season. The problem, therefore, is to train the river into best possible alignment, hold it there and provide a channel that will be economical to maintain at navigable depths in low water season.

15.5.13 To obtain a channel of required depth and width it is necessary to undertake conservancy measures which include maintenance of channel alignment, establishment of navigational aids and provision of pilotage services where necessary. Hydrographic and hydrological surveys are pre-

requisite for planning river conservancy works. These surveys yield valuable information for studying changes in channel formation, siltation and bank erosion, thereby making it possible to undertake timely and corrective measures for ensuring adequate depth and stability of navigation channels.

15.5.14 To maintain a channel in navigable conditions there is an urgent need to;

(i) frame a detailed conservancy programme for each navigable section of the waterways;

(ii) undertake maintenance works regularly on a priority basis;

(iii) make specific financial provision for conservancy and maintenance works; and

(iv) set up an independent authority to design, direct and execute such projects.

15.5.15 For preparing a detailed waterway development programme there is, in our opinion, great urgency for undertaking a systematic programme of hydrographic surveys and investigations. This work may be entrusted to an independent authority suggested by us in para 15.5.17. The authority should build up a hydrographic survey organisation equipped with fully trained technical personnel, survey vessels and equipment. The surveys should be directed to collect precise information on channel width, depth, sinuosity and radius of curvature; slope of free waterway surface (average flow velocity); water discharge; and nature of river bed. Simultaneously, attention should be paid to classification of inland waterways and hydraulic structures built on them. Waterways may be classified as follows :

(i) National waterways.

(ii) Inter-regional or Inter-State waterways.

(iii) State waterways.

(iv) Local waterways.

The channel formation for separate sections of inland waterways should be determined, taking into account technological and economic aspects, including future volume of traffic and ship building designs. The conservancy and maintenance works plan for each wateway must concentrate on the following areas :

(i) Improvement of physical characteristics of navigation channel through deepening river beds, narrowing excessively wide reaches, closing of minor channels and banks and cutting through sharp bends. To execute these works, we recommend that the authority must plan regular annual dredging schedules for dredging of shoals, river bends, and cutting of loops for straightening rivers to keep the channel open to traffic;

(ii) setting up a system of navigation aids, including channal-marking and a signalling system to ensure safe, round-the-clock navigation;

(iii) provision of terminal facilities on major inland river ports and launch landing stations (ghats); and

(iv) permanent inspection and maintenance of waterways.

15.5.16 Finally, the Central Government must provide funds to the proposed authority for execution of works. Being an apex organisation, the authority must have regional offices to accomplish these works. Each regional office must have a technical section well-equipped with hydrotechnical transport, structure, dredgers and bottom cleaning equipment used for bed surveying, improving and maintaining navigable conditions.

Organisational Set up

15.5.17 The need for setting up a suitable organisational machinery to formulate and execute programmes and projects of IWT, both at the Centre and at State levels, has been highlighted by a number of expert committees in the past. We also are of the opinion that the present set up of IWT directorate (Ministry of Shipping and Transport at the Centre) is not geared to undertake the responsibility of investigation, planning, execution and co-ordination of IWT developmental projects. The IWT directorate is merely an advisory body without any power to allocate funds for developmental

schemes and their execution. IWT schemes, at present, are executed through Central and State agencies. We reiterate that the present constitutional position of waterways is a major hindrance in unified control and development of navigable waterways. To overcome these difficulties, we recommend (i) a constitutional change in the status of waterways, and (ii) setting up an independent authority at the national level for development and maintenance of waterways in the country.

15.5.18 In our opinion, a statutory authority named Inland Waterways Authority of India (IWAI) may be set up. There are already independent authorties in other sectors of transport. We suggest that IWAI may be entrusted with the responsibility of conducting economic surveys to assess the future potential of traffic and providing infra-structural and overhead facilities in this sector. In addition, the authority should also be entrusted with IWT regulatory and administrative functions. A detailed charter of functions of IWAI is given in annexure 15.4. The functions broadly fall into four groups (i) maintenance, and conservancy, (ii) research and planning, (iii) commercial, including co-ordination, and (iv) administration and finance.

15.5.19 It is suggested that the authority should give first priority to traffic surveys for assessing future potential for waterways The surveys will assist the authority in formulation of channel development programme, details of terminal facilities, and investment proposals.

15.5.20 It is recommended that the authority may be empowered to charge service fees on registration of boats and crafts, issue certificate of fitness, permit for right of operations, and licence for the crew. The authority may also be authorised to make a reasonable service charge on shipping companies for such services as pilotage, navigational aids and terminal facilities and removal of ship wreckages. In addition, the authority should be empowered to impose fines and penalities on those violating regulatory and operational procedures laid down by the authority on behalf of the Government. Income accruing to the authority may be pooled in a waterways improvement fund to be administered by the authority.

15.5.21 It is further recommended that initial funds to set up IWAI and to purchase equipment for hydrographic surveys, dredging and track works, may be provided by the Central Government as an outright grant to it. IWT schemes, at least Central and Centrally-sponsored, approved under the Five Year Plans, should be entrusted to the authority for implementation. These funds may be made available in annual development programmes.

Modernisation of Fleet

15.5.22 We believe that to encourage IWT there is an urgent need to replace old and obsolete crafts with vessels of modern vintage, standardise craft design, and adopt modern technology in ship-building activities. There is also a need for research in modern ship-building designs, suitable to local conditions. What we need in India are low draft vessels with carrying capacity of 1,000 to 1,500 tonnes for long haul operations. Research may be directed to bring down ship-building costs and fuel consumption per unit of output. It is expected that small tugs pulling four-to-five boats of 100 tonnes each at a time over medium and short distances on a canal system will prove to be economical in freight transportation. With regard to country boats there is need to introduce mechanisation. We recommend that a pilot project be taken up to find out a suitable type of engine and hull design for mechanisation of country boats.

15.5.23 Since most owners and operators of inland vessels do not have adequate resources for modernisation and mechanisation of their crafts, it is suggested that Government may consider a scheme for granting loan assistance on easy terms to such entrepreneurs. There was a provision of Rs. 150 lakhs for this scheme in the original Fifth Five Year Plan but due to paucity of funds it was abandoned. We recommend that an Inland Vessels Development Fund should be established on the lines of the Shipping Development Fund for financial assistance to IWT operators for acquisition of new crafts, modernisation of existing vessels, and mechanisation of country boats.

Insurance

15.5.24 For regulating operation of mechanised vessels the Ministry of Shipping and Transport, in 1978, has amended the Inland Steam Vessels Act, 1917* and provide for insurance of passengers and property on board inland vessels against third party risks. Deterrent provision has also been made for offences of overloading to ensure safety of inland vessels, passengers and crew on board. Disciplinary provisions on lines of existing provisions in the Merchant Shipping Act, 1958, have also been incorporated in the Inland Vessels Act, 1917 to avoid dislocation of services. We recommend that insurance companies may be directed to insure freight cargo in transit on inland vessels at a reasonable premium, which may be prescribed by the Government. A provision for settlement of claims and disputes of shippers with shipping companies and vice versa may be considered. This seems to be necessary to build confidence of users in IWT operations.

Pricing Policy

15.5.25 In some States fares for ferry services and freight rates for mechanised crafts operated by public sector undertakings are prescribed and approved by respective State Governments. Private operators are generally free from statutory control on fares and freight rates charged by them.

15.5.26 We are of the opinion that transport undertakings be allowed to fix their own fare and freight rates. The State Governments may exercise control over the broad policy framework laid down by the National Transport Commission. We believe that unless there are strong grounds to the contrary, fare and freight rate charged by a particular transport agency must cover the operating cost of the service. A strict adherence to this rule is necessary if misallocation of resources is to be avoided.

15.5.27 The working expenses of IWT operations are presently higher than they need to be because of lack of investment in infra-structure facilities. If fares and freights of IWT operators are raised on the basis of their present cost structure, this would almost certainly drive these operators out of business in view of their high costs in comparison with both rail and road. Such a situation might arise even for transport of bulk commodities such as coal, ore. cement and salt, unless movement involved is point topoint and over shorter leads. There is thus a case for reducing IWT's marginal costs by the public exchequer making appropriate investment infrastructure. Infra-structural invesment on only covers development of channel and terminal facilities but also modernisation of vessels plying on waterways.

15.5.28 The fact remains that in the Indian context IWT to-day may have a minor role to play, as potential for its growth exists only in limited areas. Wherever such potential exists it can be a useful supplementary mode of transport. But even this will need considerable Government support as it may not be in a position to meet the cost of infra-structural maintenance.

15.5.29 In areas where Government feels the need for keeping fares and freights below operating cost, it would need to subsidise the undertaking for such operations. In addition, State Governments are advised not to impose new taxes, namely, passengers and goods tax, on IWT traffic for the time being.

15.6 Summing Up

15.6.1 Inter-modal cost comparison shows that IWT has a cost advantage over rail and road transport for movement of bulk commodities, only when points of origin and destination are located on waterfront involving no transfer of freight to another mode. It also has relative low energy intensities. The future of inland water transport however, lies mainly in catering to project oriented traffic between a pair of points on a water-front. But this will be possible only if government provides necessary infra-structural facilities such as channel, maintenance and conservancy. There is also need for proper organisational set up for undertaking traffic potential surveys and subsequent planning and execution of projects and for their co-ordination.

* This Act is known as Inland Vessels Act, 1917.

(Annexure 15.1)

Cost of Operation of Barges for Freight Haulage

A Set of Assumptions

Assumption	Self-Propelled Barge (capacity in tonnes)			Tug-Barge Train Combination		
	500	1,000	1,500	1 Tug+4 dumb barges of 125 tonnes each (total capacity 500 tonnes)	1 Tug+5 dumb barges of 200 tonnes each (total capacity 1,000 tonnes)	1 Tug +6 dumb barges of 250 tonnes each (total capacity 1,500 tonnes)
1	2	3	4	5	6	7
(i) Capital Cost of Flotilla (in Rs. lakh)	30 0	40.0	65.0	42.0	50.0	95.0*
Dumb barge cost 125 tonnes @Rs. 1.5 lakhs 200 tonnes @ Rs. 2.0 lakhs 250 tonnes @ Rs. 2.5 lakhs						
(ii) Working Capital (in Rs. lakh)	1.5	2.5	3.3	2.1	2.5	4.8
(iii) Life of Flotilla (in years)	20	20	20	20	20	20
(iv) Scrap value of Flotilla (at 20 per cent of the original price) (in Rs. lakh)	6.0	8.0	13.0	8.4	10.0	19.0
(v) Annual Depreciation charge per flotilla (in Rs.) (On sinking fund method @ 12 per cent per annum rate of interest)	33,309.0	44,412.0	72,170.0	46,633.0	55,515.0	105,479.0

(Annexure 15.1 con'd)

1	2	3	4	5	6	7
(vi) Annual rate of interest (in Rs. lakhs) (@ 12 per cent per annum on capital costs of flotilla + working capital)	3.8	5.0	8.2	5.3	6.3	12.0
(vii) Annual Insurance Premium (in Rs. lakhs) (@ 3 per cent of the insured amount i.e. the original cost of the flotilla)	0.9	1.2	2.0	1.3	1.5	2.9
(viii) Crew Size (per shift in number)	5	6	6	13	16	18
(ix) Working Hours (per day)	24	24	24	24	24	24
(x) Working days (per annum)	300	300	300	300	300	300
(xi) Speed (km/hr)	12	12	12	12	12	15
(xii) Fuel Consumption (Litres/hr.)	40	50	60	40	50	60
(xiii) Fuel Price per litre (in Rs.)	1.5	1.5	1.5	1.5	1.5	1.5
(xiv) Average Lead :						
(a) 50 kms.						
(b) 100 kms.						
(c) 300 kms.						

* It includes cost of one additional set of dumb barges.

Barge Operating Costs : Cost Computation

(Annual Cost in Rs. '000)

Cost Components	Flotilla Capacity in (tonnes)					
	Self-Propelled barge			Tug-barge		
	500	1,000	1,500	500	1,000	1,500
1	2	3	4	5	6	7
A. **Fixed Costs**						
1. Annual Capital at charge (Depreciation Interest)	411.3	548.4	891.2	575.6	685.5	1302.5
2. Insurance premium	90.0	120.0	195.0	126.0	150.0	285.0
3. Crew wages & allowances (3 shift operation)	135.0	160.0	160.0	255.0	310.0	340.0
4. Shore administration and terminal establishment expenses (excluding wharfage.)	50.0	50.0	50.0	50.0	50.0	50.0
5. Repair and maintenance.	300.0	400.0	650.0	420.0	500.0	950.0
6. Stores and provisions	30.0	40.0	65.0	42.0	50.0	95.0
Sub-total	1016.3	1318.4	2011.2	1468.6	1745.5	3022.5
B. **Variable Cost**						
7. **Fuel, Oil and Lubricants**						
(i) 50 kms.	207.9	259.9	261.3	356.5	445.5	498.9
(ii) 100 kms.	277.2	346.5	371.2	403.9	504.9	579.1
(iii) 300 kms.	383.1	478.9	549.4	447.4	559.4	662.3
8. **Loading and unloading charges**						
(a) Charges at 100 per cent load factor at different leads of traffic						
(i) 50 kms.	598.5	1197.0	1995.0	1050.0	2100.0	3780.0
(ii) 100 kms.	434.0	868.0	1512.0	630.0	1260.0	2362.5
(iii) 300 kms.	203.0	406.0	724.5	238.0	476.0	878.5

Annexure 15.2 (Contd)

1	2	3	4	5	6	7
(b) Loading & unloading charges at 75 per cent load factor at different loads of traffic.						
(i) 50 kms.	448.9	897.7	1496.3	787.5	1575.0	2835.0
(ii) 100 kms.	325.5	651.0	1171.8	472.5	945.0	1771.9
(iii) 300 kms.	152.3	304.5	543.4	178.5	357.0	658.9
9. (a) Wharfage (at 100 per cent load factor)						
(i) 50 kms.	85.5	171.0	285.0	150.0	300.0	540 0
(ii) 100 kms.	62.0	124.0	216.0	90.0	180.0	337.5
(iii) 300 kms.	29.0	158.0	103.5	34.0	68.0	125.5
(b) Wharfage (at 75 per load factor						
(i) 50 kms.	64.1	128.3	213.7	112.5	225.0	405.0
(ii) 100 kms.	46.5	93.0	162.0	67.5	135.0	253.0
(iii) 300 kms.	21.7	43.5	77.6	25.5	51.0	94.1
10. **Sub-total** : Variable Cost (a) at 100 per cent load factor						
(i) 50 kms.	891.9	1627.9	2541.3	1556.4	2845.5	4818.9
(ii) 100 kms.	773.2	1338.5	2099.2	1123.9	1944.9	3279.1
(iii) 300 kms.	615.1	942.9	1422.4	719.4	1103.3	1666.3
(b) Sub-total : Variable cost at 75 per cent load factor						
(i) 50 kms.	720.9	1285.9	1971.3	1256.4	2245.5	3738.9
(ii) 100 kms.	649.2	1090.5	1705.0	943.9	1584.9	2604.1
(iii) 300 kms.	557.1	826.9	1170.4	651.4	967.3	1415.3
11. (a) Total cost of operation per tonne-km (Paise) at 100 per cent load factor						
(i) 50 kms.	11.3	8.7	8.1	10.1	7.7	7.3
(ii) 100 kms,	7.3	5.4	4.8	7.2	3.7	4.7
(iii) 300 kms.	4.7	3.3	2.8	5.4	3.5	3.1
(b) Total cost of operation per tonne-km (Paise) at 75 per cent load factor						
(i) 50 kms.	13.74	10.27	9.41	22.16	8.90	8.47
(ii) 100 kms.	9.05	6.54	5.80	8.96	6.18	5.56
(iii) 300 kms.	6.06	4.13	3.43	6.94	4.44	3.91

Annexure 15.3

Barge Operations Annual Output Levels

Lead Distance (in kms)	Type of Operation								
	Self propelled (carrying capacity/tonnes)								
	500			1,000			1,500		
	No. of round voyages	Tonnes carried (in ' 000)	Tonne kms. performed (in ' 000)	No. of round voyages	Tonnes carried (in ' 000)	Tonne kms performed (in ' 000)	No. of round voyages	Tonnes carried (in ' 000)	Tonne kms. performed (in ' 000)
1	2	3	4	5	6	7	8	9	10
50	342	171	17,100	342	342	34,200	380	570	57,000
100	248	124	24,800	248	248	49,600	288	432	86,400
300	116	58	34,800	116	116	69,600	138	207	124,200

Lead Distance (in kms)	Tug-Barge Train (carrying capacity/tonnes)								
	500			1,000			1500		
	No. of round voyages	Tonnes carried (in ' 000)	Tonne kms. performed (in ' 000)	No. of round voyages	Tonnes carried (in ' 000)	Tonne kms performed (in ' 000)	No. of round voyages	Tonnes carried (in ' 000)	Tonnes kms. performed (in ' 000)
11	12	13	14	15	16	17	18	19	20
50	600	300	30,000	600	600	60,000	720	1,080	108,000
100	360	180	36,000	360	360	72,000	450	675	135,000
300	136	68	40,800	136	136	81,600	167	251	150,600

Note : (i) Waiting time assumed for self propelled barge operations is 12 hours per round voyages, and tug-barge operations 3 hours, irrespective of the size of the flotilla, both in terms of tonnes carried and number of dumb barges attached.

(ii) Tonnes carried and tonne kms performed are worked on the assumption of 100 per cent load factor.

Annexure 15.4

Charter Of Functions of Inland Waterways Authority of India (IWAI)

1. To carry out economic surveys to assess future traffic potential on main rivers, feeders and creek routes.

2. To draw up programme of river/canal conservancy woiks, including river training works and provision of navigational aids.

3. To draw up programmes of dredging requirements and priorities for efficient maintenance of existing navigable waterways and for resuscitation of dead and dying rivers, channels or canals for navigation.

4. To develop,. maintain and operate inland river ports, landing ghats and terminal facilities in such ports or ghats.

5. To maintain pilotage and hydrographic survey services.

6. To disseminate navigational and meterological information including publication of river charts.

7. To carry out removal of wrecks and obstructions in navigable waterways.

8. To fix maximum and minimum fares and freight rates for inland water transport on behalf of the Goverment.

9. To approve time tables for passenger service.

10. To ensure co-ordination of inland water transport with other forms of transport, withmajor sea ports and with industry, trade and agricultural interests for the optimum utilisation of the available tiansport capacity.

11. To conduct research in matters relating to inland water transport including development of (i) craft design, (ii) techniques of towage, and (iii) landing and terminal facilities.

12. To arrange programme of technical training for inland water transport personnel.

13. To maintain liaison with the shipyards and ship repairing industry to meet the requirements of the inland water transport fleet, repairs and new construction.

14 To register country boats and mechanised crafts and issue of certificate of fitness for vessels plying on waterways.

15. To issue permit or licence for right of operations.

16. To issue certificate/licence for various categories of crew of inland vessels.

17. To perform any other function related to IWT assigned by the Government.

Chapter 16

Ports and Harbours

16.1 Introduction

16.1.1 A port - a transhipment point between sea and surface transport and of entry and exit for import and export trade - plays a unique role in the country's transport system. As a transhipment point, port efficiency critically determines the comparative cost advantage of sea transport. The growth of coastal shipping and inland water transport also depends crucially upon how quickly and efficiently goods are handled at the port which is a point of entry or exit for international trade. Along with the role of major ports, we here discuss that of intermediate and minor ports in relation to requirements of coastal and sailing vessels.

16.1.2 The need for adequate port capacity for rapid economic development can hardly be overemphasised. In an economy like ours the pace of economic development is vitally linked with growth of foreign trade. The total value of Indian exports rose from Rs. 600 crores to Rs. 5,724 crores and imports from Rs. 650 crores to Rs.6,766 crores in 1951-79. The total volume of traffic handled at major ports also increased from 19.2 millon tonnes to 69.7 million tonnes during this period. It is on account of this vital importance of port capacity for growth of out international trade that the port development programme has received attention right from the First Five year Plan period.

16.1.3 But a major constraint on growth of our international trade has been the inadequacy of port capacity reflected in frequent build-up of port congestion. Port congestion, if frequent and long, as appears to be the situation at the port of Bombay, results not only in loss of foreign exchange as demurrage charges paid to foreign shipping companies, but it also adversely affects growth of national output. The delay in clearance of essential imports, such as machinery and raw materials required for industrial development. slows down implementation of projects. The congestion at ports adversely affects competitiveness of our exports on account of delays in despatch of cargo and higher charges and fees which have to be paid at congested ports. We, therefore, consider it of the utmost importance that port capacity should be continually augmented to keep pace with growing needs of the economy.

16.2 A Historical Perspective

16.2.1 At the time of independence, major ports in the country were in a poor and dilapidated state because of intensive use, lack of proper maintenance and inadequate replacement of assets during World War II. The port of Karachi which, to a large extent, served the needs of the areas now covered by Punjab, Haryana, Jammu & Kashmir, Rajasthan, Uttar Pradesh, Madhya Pradesh and Gujarat, became part of Pakistan, and the remaining major ports of Calcutta, Bombay, Madras, Cochin nnd Vishakhapatnam were not in a position to cope with existing traffic volume. To correct this imbalance, port development received continuous attention in determination of inter-sectoral investment allocations, with a view to meeting the evergrowing demand for port facilities. Not only new ports have been ndded to the list of major ports but additional capacities have also been created at existing ports. At present India has 10 major ports and 168 minor ports, including 23 intermediate ports.

New Major Ports

16.2.2 At the commencement of the First Plan in 1951, there were five major ports, namely, Calcutta, Bomay, Madras, Cochin and Vishakhapatnam. Since then new major ports of Kandla, Mormugao, Paradip, Mangalore and Tuticorin have been added to the list. Before Kandla was declard a major port, it was a small port in the erstwhile State of Kutch, built largely for handling sea salt for export to Calcutta. With the loss of Karachi

in 1947, the need for a major port in this area to serve growing requirements of northern India was keenly felt. Construction of Kandla port was started in 1952 and, with the construction of four deep water berths together with ancillary structure, was completed in 1957. By 1959 the port was fully equipped with requisite facilities and connected with a metre gauge railway which enabled transportation of cargo to north Indian States. A broad gauge connection was provided in 1969.

16.2.3 After the liberation of Goa from Portuguese control, Mormugao was declared a major port in 1963. The port is a natural harbour permitting access to the navigable waters of Mandovi and Zuari rivers.

16.2.4. Before construction of a port at Paradip in 1962, there was no port of any consequence along the eastern coast of India between Calcutta and Vishakhapatnam over a coast length of about 840 kms. The construction work for Paradip was started by the Orissa Government. Subsequently the Government of India decided to declare Paradip as a major port in 1965. The port was commissioned in 1966.

16.2.5. New Mangalore and New Tuticorin, with their newly-constructed harbours and modern facilities, were declared as major ports in 1974, and opened to traffic in 1975.

Plan Programmes

16.2.6 The main emphasis during the first two Plans was on rehabilitation and modernisation of existing facilities at the major ports and augmentation of their berthing capacities. Despite these efforts, ports remained sub-standard in many respects. Draft limitations, for example, precluded handling of modern bulk carriers and tankers, the size of which had grown beyond the drafts available at ports. Loading and unloading were manual as ports were not equipped with mechanical facilities. All this caused unnecessary delays to ships and moun ing congestion at parts. To improve conditions and bring relief to port users, a concerted effort was made in the Third Plan to create new capacity and modernise existing facilities. This included modernisation and expansion of Bombay port, construction of deep draft port at Haldia to serve as a satellite port for Calcutta, and development of Mangalore and Tuticorin as major ports. The emphasis on improvement of port facilities continued to be the priority objective in formulation of subsequent three Annual Plans (1966-69) which, accordingly, incorporated development of a number of port projects, including Madras Outer Harbour Project for handling large-size oil tankers and ore carriers, Vishakhapatnam Outer Harbour Project for handling iron ore, and dredging of the main harbour channel at Bombay port.

16.2.7 The programme for port development in the Fourth Plan focused mainly on completion of ongoing projects, particularly the Haldia Dock, expansion of capacities at Tuticorin, Mangalore, Vishakhapatnam Outer Harbour, Madras Outer Harbour, and improvement of ore handling facilities at Paradip and Mormugao. The two new items added to port development programme were setting up of a Central Dredging Organisation to build up dredging capacity and river training works in the Bhagirathi Hooghly River System, with a view to optimising benefits from the Farakka Barrage. The main emphasis in formulation of the Fifth Plan was on completion of ongoing schemes. However, a few new schemes were taken up during this Plan period, which included replacement of oil pipelines at Bombay, offshore terminal project at Salaya to meet requirements of crude transport for the Mathura and Koyali refineries, and, development of facilities at new Mangalore port for the Kudremukh Iron Ore Project.

16.2.8 During the Fifth Plan period two port projects were completed. The Madras and Vishakhapatnam Outer Harbour Projects were commissioned, although the high speed mechanical iron ore handling plant had not become fully operational. Secondly, the Haldia Dock System was put into operation in March, 1977 for coal and iron ore traffic. Work was still in progress on installation of mechanical facilities for handling fertilizers at the fertilizer berth, development of a jetty for handling salt and sulphur and a berth for container traffic at Haldia. At Cochin, the first phase of a programme for providing handling facilities for container traffic was completed and container ships started calling at the port.

16.2.9 In the Sixth Plan (1978-83) main emphasis would be on completion of facilities like warehouses and wharfages to allow for optimal capacity utilisation. Provision has been made for

development of container facilities as selected ports, and also for preparing a project report on Nheva Sheva Port near Bombay.

16.3. Growth of Traffic at Major Ports

16.3.1. Since 1951 there has been a steady growth of traffic at various ports, as will be observed from table 16.1.

Table 16.1

Growth Of Traffic at Major Ports

Year	Traffic (million tonnes)	Indices (Base 1970-71) National Income	Traffic at Major Ports
1	2	3	4
1950-51	19.2	48.8	34.5
1955-56	22.6	57.9	40.6
1960-61	39.5	70.3	70.9
1965-66	50.4	78.9	90.5
1970-71	55.7	100.0	100.0
1975-76	65.4	115.9	117.4
1976-77	67.8	117.5	121.7
1977-78	66.0	126.5	118.5
1978-79	69.7	—	125.1

16.3.2 The growth of traffic at each major port from 1950-51 to1978-79 is shown in annexure 16.1. The total traffic handled by major ports has increased progressively from 19.2m. tonnes in 1950-51 and 57 to 69.7 m. tonnes in 1978-79, except for a slight decline in 1977-78 due to a decline in iron ore export and import of foodgrains.

16.3.3 A salient feature of traffic pattern is near stagnation of Calcutta which until 1950-51 was the premier port of the country. At the same time Bombay has emerged as the leading port, the traffic handled by it having increased from 7 m. tonnes in1950-51 to 15.7 m. tonnes in 1978-79. Presently, the port of Bombay accounts for about 36 per cent of total traffic (excluding POL, iron ore and coal) handled at major ports in the country. There has also been a significant growth of traffic at Madras, Cochin and Vishakhapatnam ports.

16.4 Composition of Traffic at Major Ports

16.4.1 The composition of traffic handled at major ports has undergone significant changes since 1951. The commodity composition of port traffic and variations in share of each commodity in total traffic are shown in annexure 16. II. Port-wise and commodity-wise traffic data are given in annexure 16. III.

16.4.2 The two commodities which account for a major increase in share of port traffic are POL and iron ore. The traffic of these two commodities together increased from 3.1 m. tonnes in 1950-51 to 47.4 m. tonnes in 1978-79. The traffic of fertilisers also registered an increase of about 5 m. tonnes during this period. For foodgrains, however, there have been wide fluctuations from year to year ; the highest level of traffic was reached in 1966-67 when 9.7 m. tonnes of foodgrains were imported. In recent years, following an improvement in foodgrains production in the country, the import of foodgrains has been stopped and, in fact, the process has been reversed with the export of 0.9 million tonnes of foodgrains in 1978-79.

16.5 Plan Outlay on Ports

16.5.1 Since April, 1951 till 31 March, 1978, an expenditure of Rs. 957 orores has been incurred on development of major ports. A provision of Rs. 390 crores has been made in the Five Year Plan 1978-83.

16.6 Traffic Projection

16.6.1 Before we discuss port traffic projections and relate them to existing port capacities to get an idea of magnitude of investment required for port development in the next two decades or so, it may be useful to compare the actual traffic

with targets fixed in the respective Plan periods. These are given in table 16.2.

Table 16.2

Targets and Actual Traffic at the Ports

(In million tonnes)

Year	Targets as per Plan	Actual traffic
1	2	3
1967-68	58.00	55.20
1968-69	59.40	56.04
1973-74	77.00	63.92
1978-79	77.00	69.70

16.6.2 The actual traffic handled at ports lagged behind targets presumably because assumptions behind these forecasts did not materialise. As we know, international trade depends on various factors, many of which are exogenous and beyond our control, and it often happens that unforeseen developments in other countries affect movement of specific import or export cargo, which influence growth of port traffic.

16.6.3 In planning of port development, the crucial significance of accurate and reliable traffic estimates can hardly be overemphasised. Two considerations are of paramount relevance. First, as construction of port capacity invariably entails a long gestation lag due to technical and other procedural reasons, planning for port capacity expansion must be undertaken long before congestion actually builds up at ports. Secondly, since port capacity can only be used at specific locations and is not transferable to other locations without involving huge losses, there is great investment risk if expected traffic demand fails to materialise. These considerations obviously underline the need for caution in port development programmes.

16.6.4 The port traffic for 1982-83 worked out in the Five Year Plan 1978-83 is estimated at about 100 m. tonnes on the basis of import and exports targest laid down in the Plan. Tentative projections of import and export of major commodities drawn up in the Planning Commission put total port traffic at about 120 m. tonnes in 1987-88 and 135 m. tonnes in 1992-93. Table 16.3 shows commodity-wise break up of actual traffic for 1978-79 and projections for 1982-83 1987-88 and 1992-93.

Table 16.3

Projections of Port Traffic

(In million tonnes)

Commodity	Actual traffic 1978-79	Projected Traffic 1982-83	1987-88	1992-93
1	2	3	4	5
1. POL	27.3	28.9	36.0	44.0
2. Iron Ore	20.1	37.0	40.0	40.0
3. Coal	1.2	5.8	7.0	7.0
4. Fertilisers	5.3	8.2	13.0	17.0
5. Foodgrains	0.9	1.0	2.0	2.0
6. Other general cargo	14.9	19.3	22.0	25.0
Total :	69.7	100.2	120.0	135.0

16.6.5 Traffic projections for 2000 A.D. have not been attempted but these could be roughly around 155 m. tonnes. More relevant, however, is to have a broad idea of magnitude of total traffic volume and its port-wise distribution. Two points are pertinent here. First, in the next two decades, volume of our foreign trade is expected to expand substantially even if the country merely maintains its relative share in international trade which since the 'sixties, has been growing by 6 per cent per annum. If we assume the same trend in future and maintain our relative share, it is not unreasonable to expect that the size of our foreign trade would be doubled by the end of the century.

Based on these calcultations, a figure of 150 to 155 m. tonnes as a likely volume of traffic at our major ports does not appear to be on the high side. Secondly, there is a possibility of change in composition of our foreign trade with a larger share for such finished products as textiles and engineering goods. Obviously, such a change would greatly influence space requirements at ports. High value goods generally take the form of general cargo which is increasingly getting containerized, following technological developments in port handling facilities in advanced countries. Thus, even if the volume of traffic handled at our ports were to remain stagnant the qualitative change likely to occur in its composition will require substantial investment in modernisation and re-development of our port system. It is in relation to these developments that the case for expansion and modernisation of port capacity, particularly the need for development of a port for containerised traffic at Nheva Sheva near Bombay, has to be viewed.

16.7 Port Capacity

16.7.1 A proper assessment of port capacity is essential both for optimal utilisation of existing capacity and addition to it to meet growing needs of the economy. A number of attempts have been made to measure port capacity in the past but there appears to be no consensus on the methodology used or essimates made for it. Before data on our port capacity are examined, a few conceputal points need clarification. First, there are two distinct aspects of port capacity, namely, capacity of a port to (a) receive ships requiring different drafts; and (b) handle cargo at the berth with speed and efficiency to minimise ships detention time. The first factor may preclude ships requiring deeper drafts from using certain docks of a port system or it may even restrict use of the port as a whole for these ships if its approach channel or entrance lock acts as a constraint on their entry into the port. Secondly, ships arrive in a random fashion and congestion occurs only when they arrive in a bunch. Unfortunately, the arrival pattern of ships is not within the control of port trust authorities; they must treat this as something beyond their control and plan their operations accordingly. This implies that, as in any transport industry, we must measure port capacity in relation to peak demand when maxium bunching occurs in ship arrivals. Thirdly, since demand for port capacity is by and large location-specific, it would be more sensible for port planning if port capacity is related to traffic projected at each port, instead of relating aggregate capacity to aggregate traffic demand. This constraint stemps from the fact that while tramp ships may to a certian extent be diverted from one port to another, such diversion is not feasible for conference liners. Even for cargo carried by tramps, such diversion may be restricted on account of limitations on internal transport system. Finally, port capacity is by no means a homogeneous product; the type of handling facilities required differ sharply for different traffic categories. This limits interchangeability by berths as between different kinds of cargo in a short period. The larger the number of specialised berths at a particular port, the smaller is its capacity to meet demand fluctuations.

16.7.2 In measuring port capacity, therefore, it is useful to keep the following factors in view :

(i) number, depth, length and layout of berths;

(ii) size of ships and pattern of their arrival;

(iii) approach channels and entrance lock restrictions;

(iv) type and diversity of cargo;

(v) port facilities such as communications, pilotage and night navigation;

(vi) number of labour shifts and labour efficiency;

(vii) handling facilities available, including mechanised loading or unloading, pipeline facilities and midstream loading or nuloading;

(viii) apron space available for loading or unloading at wharves and storage facilities at ports; and

(ix) quick clearance from docks by internal transport.

16.7.3 Considering the multiplicity of factors affecting port capacity, any attempt to quantify

it has its limitations and, therefore, would be subject to qualifications. In the first place, in view of non-interchangeability of berths, port capacity must be assessed separately in relation to three broad categories of cargo, namely, (a) wet or liquid bulk, (b) dry or solid bulk, and (c) break bulk. Secondly, the most critical single factor affecting the throughput ot a berth is the average number of ships it can service per day, a parameter which depends partly on the type of handling facilities available and partly on what is considered an optimum rate for berth occupancy. Obviously,the more efficient cargo-handling facilities are, the greater would be its daily throughput.

16.7.4 As regards berth occupancy, theoretically, a berth can be used for all the 365 days of a year. In actual practice, however, berth occupancy is limited by the number of days a berth must be left free for maintenance, dredging and repair work. The berth occupancy ratio internationally considered optimal is 67 per cent. A committee (Mehta Committee-1978) which recently looked into the problem of congestion at Bombay port estimated an annual throughput of approximately 1.3 to 1.5 lakh tonnes, assuming a berth occupany of 70 to 75 per cent for a general cargo berth handling a modern ship of approximately 160 metres (525 feet) in length and operating five hatches at a time with shore cranes or ship's own derricks. We understand that berth occupancy of over 70 to 75 per cent leads to poor port maintenance and hence to deterioration in the quality of port services. As against these norms, the present berth occupancy at Bombay port, for instance, is estimated at about 90 per cent, which shows the pressure of demand at that port. The utilisation of berths on this scale is considered extremely damaging to efficient operation of the port system. In the interest of efficient port operation, it is absolutely essential that the present high level of berth occupancy is brought down. While the international norm of 67 per cent may be an ideal one, it would not be practicable to achieve this level in the present context and we would suggest that as a first step, a norm of 75 per cent berth occupancy may be adopted for our ports.

16.7.5 The throughput of a berth will also depend upon the type of cargo handled. Thus, for general cargo, taking an average annual occupancy of not more than 75 per cent, the average annual output of a general cargo berth works out at 1.5 lakh tonnes. However, for dry bulk cargo, such as fertilizers and raw materials, a berth throughput at twice the rate of general cargo, that is 3 lakh tonnes per anumm, is not considered excessive. For foodgrains a berth throughput of 6 lakh tonnes per annum is considered normal with modern cargo handling facilities.

16.7.6 The Committee was faced with a problem of severe capacity shortages and congestion at major ports. We have analysed the situation. In 1976 the Planning Commission made a study of port capacity in which they assumed a berth occupancy rate of 300-250 days in a year for handling foodgrains and fertilisers depending upon whether there was night navigation or not and a throughput of 60 per cent of rated capacity of mechanical facilities for handling these commodities. For POL traffic, the number of days available for loading and unloading operations was assumed at 200 in a year. On these assumptions, the overall capacity of all major ports was established at about 130-133 m. tonnes for 1978-79. Ministry of Shipping and Transport, however, holds the view that berth occupancy should not be taken at more than the international standard of 67 per cent, and it has recently estimated port capacity at 111-115 m. tonnes for 1982-83, broad details of which are given in table 16.4.

Table 16.4

Major Ports - Traffic & Capacity

(Million Tonnes)

PORT	Traffic handled in 1978-79				Estimated traffic in 1982-83				Estimated capacity 1982-83			
	POL	Iron Ore	Others	Total	POL	Iron Ore	Others	Total	POL	Iron Ore	Others	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Bombay	8.04	—	7.63	15.67	12.90	—	9.84	22.74	14.50	—	6.00	20.50
2. Kandla	4.37	—	1.50	5.87	1.40	—	2.11	3.51	*3.00 to 3.05	—	2.05	*5.05 to 5.55
3. Mormugao	0.68	9.39	0.73	10.80	0.80	13.40	0.69	14.89	1.50	14.00	0.35	15.85
4. Cochin	3.83	—	1.63	5.46	3.70	—	1.60	5.30	3.50	—	1.95	5.45
5. Calcutta Haldia	3.91	0.09	3.98	7.98	3.30	1.50	9.28	14.08	4.00	4.00	11.26	19.26
6. Paradip	—	1.73	0.43	2.16	—	3.50	1.89	5.39	—	3.00 to 4.00	0.35	3.35 to 4.35
7. Vishakhapatnam	1.94	5.95	2.14	10.04	2.15	8.10	3.16	13.41	2.00 to 2.50	8.00	2.73	12.73 to 13.23
8. Madras	3.84	2.95	3.02	9.81	3.80	5.00	2.24	11.04	4.00	8.00	3.00	15.00
9. Tuticorin	0.32	—	0.74	1.06	0.51	—	2.68	3.19	1.00 to 1.50	—	4.25to 4.50	5.25 to 6.00
10. Mangalore	0.34	0.02	0.51	0.87	0.33	5.50**	0.80	6.63	1.00 to 1.50	7.50	0.55	9.05 to 9.55
Total	27.27	20.14	22.31	69.72	28.89	37.00	34.29	100.18	*34.50 to 36.50	44.50 to 45.50	32.49to 32.74	111.49*to 114.74

* Excluding capacity to handle 8.0 to 12.0 m. tonnes of POL at Salaya off-shore terminal.

** Revised estimate against the earlier estimate of 7.5 m. tonnes.

Source : Ministry of Shipping & Transport.

In our view, the important broad conclusion is that while we may have surplus port capacity for handling wet bulk and dry bulk cargo, the capacity for handling general or break bulk cargo is likely to be short of demand at most major ports. This problem would be acute, in particular, at Bombay.

16.7.7. The break bulk or general cargo is a nebulous term; anything that cannot be handled in bulk may be treated as break bulk cargo. For example, fertilizers or fertilizer raw materials when not handled in bulk are treated as break bulk cargo and added to total quantum of general cargo. But recent technological advances in unitisation of cargo have completely revolutionised handling of general cargo. In particular growth of container traffic has reduced the importance of break bulk cargo in the total quantum of port traffic but, at the same time, it has brought to the forefront the great urgency of development of container handling facilities at our major ports if we are to derive full benefits of this technological revolution in transport industry.

16.7.8 In our view a continuous assesment of port capacity in the country is essential both for optimal utilisation of available capacities and future addition to capacities to meet growing needs of the country.

16.8 Growth of Container Traffic

16.8.1 In recent years transportation or general cargo has undergone a revolutionary change by various methods of unitisation. The most remarkable aspect of this change is growth of containerisation, which facilitates door-to-door movement of cargo in standard units and through mechanical handling at every stage of transport,

16.8.2 Containerisation, first introduced in the United States in 1956 as a labour-saving device, has undergone rapid expansion. Initially, it was confined to trading activities between the advanced countries like the USA, Canada, the U.K., Japan and Australia, which were facing acute shortage of port labour. Subsequently, it was extended to trades of many developing countries under pressure from trading partners in developed contries. The progress of containerisation in world trade in terms of contrainer vessels and container-carrying capacity may be gauged from table 16.5.

Table 16.5

Growth of Container Traffic

Year	No. of container vessels		Container carrying capacity as expressed in TEU's*	
	No.	% increase	No.	% increase
1	2	3	4	5
1967	71	-	34,430	-
1977	762	973	625,259	1,716
1980 (Estimated)	1,019	34	838,905	34

Source : Report of the Working Group on Containerisation (1978)

* Twenty-foot Equivalent Unit (TEU) reflects volume of loads of containerised cargo in terms of containers of 20' × 8' × 8' size accommodating on an average 15 dead weight tonnes of freight paying cargo irrespective of the actual size of container.

16.8.3 Containerisation made a modest beginning in India in 1973 but over a short period since then it has recorded a phenomenal growth. Container traffic is presently being handled at the ports of Bombay, Calcutta and Haldia, Cochin and Madras. In 1977-78 as many as 15,362 containers were handled at these ports, compared to only 7,993 in 1975-76. None of these ports except Haldia has specialized facilities for handling container traffic. Container traffic at Bombay port is presently being handled at the Indira Docks. Container ships also use Ballard Pier berths and the Ballard Pier extension. In view of paucity of container parking space, containers are stacked at places where open space is available at the time of arrival of ships. The port authorities are presently considering a plan for developing a container freight station wi h a storage area of 20,000 sq.m. and acquiring handling equipment like gantry cranes and prime movers at a cost of Rs. 7.72 crores. However, with a limited back-up space available at the port, this new equipment may only be able to handle about thirty to thirty-

five thousand TEUs per annum.

16.8.4 Similarly, Culcutta port also does not have facilities for loading and unloading of containers and, therefore, these are being stuffed or unstuffed on board. A full-fledged container terminal with shore equipment has, however, been set up at Haldia Docks. A yard for loading and unloading and stacking of 750-1000 containers has been provided in the first phase. The inadequate capacity of roads between Haldia and Calcutta and absence of customs facilities, however, hamper full utilization of container handling equipment at Haldia. The ports at Cochin and Madras do not have special container berths at all. The containers are handled at these ports at ordinary berths with existing shore facilities.

Future Prospects

16.8.5 Container traffic is growing by leapes and bounds. For example, in 1978-79, Bombay port alone handled 39,000 containers and during the current year these are being handled at a monthly average rate of over 6,000 units. Projections of container traffic at Bombay are shown in table 16.6

Table 16.6

Projected Growth of Container Traffic in India

Year	No. of containers
1	2
1980-81	70,000
1981-82	1,03,400
1982-83	1,36,800
1983-84	1,70,200
1984-85	2,03,600

16.8.6 That none o four ports has proper shore facilities for handling containers is a mattar of serious concern. One of the disturbing facts of container handling at our ports is that cargo carried in containers has to be stuffed and de-stuffed at ports, which is done on shore or on board of vessels of Indian shipping companies. As a result, Indian importers or exporters have not been able to avail of full benefits of containerisation.

16.8.7 If we have to take full advantage of container revolution in sea transport, the need for providing adequate facilities at major ports for handling this traffic is obvious. We have suggested development of a separate container port at Nheva Sheva. This is, however, a long-term solution. In the immediate future, the urgency is for providing specialized handling facilities at major ports which are presently handling container traffic. Haldia has, of course, the requisite equipment but there is urgent need for developing back-up facilities, including internal transport system leading to the port. Need for additional container facilities should be reviewed periodically and depending on the growth of container traffic, development of requisite facilities at other ports should be considered.

16.8.8 For container traffic it is not enough to provide adequate handling facilities at ports. What is equally important is to develop the connecting rail and road system, including inland depots for containers, so that factory-to-port or port-to-factory movement containers is possible within the hinterland of ports. These aspects of container development are discussed separately, as they relate to railway or road system.

16.9 Port Congestion

16.9.1 Port congestion is a recurring problem at our major ports. At Bombay it has become chronic. The question of providing adequate capacity at Bombay port needs paiticular attention, also because most liner shipping conferences prefer to call at this port. Thus, even if at any particular point of time, excess capacity exists at other ports it may not be possible, at least in the short run, to divert liner ships from Bombay to reduce the ships' waiting time. Even for tramp ships, which are employed on charter by Indian shippers, diversion of ships from the congested port to any other port would not be worthwhile unless the cost of diversion, covering the following items, is less than of waiting :

i) additional steaming costs to alternative port;

ii) extra costs at alternative port;

(iii) extra costs of surface transportation from alternative port to final destination; and

(iv) other extra costs due to change in port of entry or exit, including cost of creation of additional capacity where necessary.

16.9.2 Therefore, while every effort needs to be made to divert chartered ships to uncongested ports and also encourage liner conferences to call at other ports besides Bombay, the port of Bombay, as far as we can foresee, will continue to bear the main brunt of port traffic, particularly in general cargo. The important question, therefore, is to find ways and means to relieve congestion at Bombay port.

16.9.3 This problem could be approached both from a short term and long term point of view. In the short term, there is, undoubtedly, considerable scope for relieving port congestion at Bombay by diverting ships to other major ports by implementing the various recommendations of the Mehta Committee (1978). We understand that action has already been initiated on a number of recommendations, as a result of which congestion at Bombay has recently eased to some extent.

16.9.4 The long term solution will, however, require considerable addition to the port's berthing capacity, including its associated back-up facilities. Here lies the crux of the problem. The Bombay port system consists of three docks, Princesss, Victoria and Indira, which together possess 52 berths. Of these, 25 berths are situated in the Princess nnd Victoria (P&V) docks and 27 berths in Indira dock. The P&V docks, built in 1875-88 with narrow gates, can only handle vessels of a maximum beam of 18.59 to 21.34 metres and a draft of 6.4 to 7.0 metres, corresponding to about 8,000 DWT. These docks have become practically obsolete for modern vessels. As regards the Indira dock (1908-1914), of the 27 berths the effective berthing capacity available is equivalent to only 23 berths, as the average size of modern ships calling at the port is such that they protrude into adjacent berths thereby rendering them non-functional. The Indira dock has a deeper draft, ranging from 7.5 metres for the five harbour-wall berths to 10.36 metres for inner dock-basin berths. The inner dock basin berths cater to ships corresponding to 30,000 to 35.000 DWT in size. Although initially two inner berths were reserved for handling container cargo, with the ever-mounting pressure of this traffic, more and more berths are now being used for handling it with the consequent presure on the port's back-up facilities.

16.9.5 It would be correct for us to assume that the long term solution to Bombay port's congestion problem is to add significantly to its capacity. Such capacity expansion is not feasible at the Indira dock. Draft limitations, non-availability of space for construction of warehousing and other service facilities and traffic saturation in access rail or road routes to the dock rule out the possibility of any major capacity expansion at the present site. It is in this context that the case for development of an ancillary port at Nheva Sheva has been put forward. We understand that the natural deep waters available at Nheva Sheva islands provide a suitable site for construction of modern deep water berths which can accommodate ships requiring draft of 14 to 15 metres. Besides, the vast area immediately available behind the proposed site can be utilised for development of back-up facilities and internal transport system required for speedy clearance of port traffic. These considerations are of particular importance for development of container handling facilities at Bombay. A modern container dock fully equipped to handle ISO standard containers requires nearly 50 acres of backup area for swift clearance of traffic from the port. An area on this scale is simply not available at the existing site of Bombay port.

16.9.6 While the foregoing considerations should suffice to justify the case for construction of an ancillary port at Nheva Sheva, two more points deserve attention. In our view, there is urgent need for development of deep draft port in the country which can receive modern ship, particularly those carrying container and bulk cargo. We understand from technical experts that Nheva Sheva is the only site available in the country that has a natural draft of 14 to 15 metres. No other port site either on the western or eastern coast of India can match the draft provided by Nheva Sheva. Secondly, and this is an equally significant consideration, the proposed port at Nheva Sheva is located within the vicinity of Bombay port system which is the major port of call for liner ships. This particular site will have the advantage of not only serving trade but also liner

trade of the country.

16.9.7 It is understood that construction of Nheva Sheva port may take eight to ten years in view of long gestation lag associated with a port development project. The incessant congestion that has occurred at Bombay port over the last two decades has already cost a lot to the country in terms of demurrage fees and lost output*. All this highlights the urgency for this particular project.

16.9.8 In the meantime, we suggest that while action on the recommendations of Mehta Committee should be taken urgently, the Bombay Port Trust should on priority basis explore the economic feasibilty of mid-stream discharge as a short-term relief measure. We understand that shipowners would be inclined to make use of such facility for loading or unloading cargo, if it is provided to them by the Port Trust at a reasonable cost, instead of waiting in a queue for a berth.

16.10 Major Constraints affecting Port Operations

16.10.1 There are also some specific constraints in port operations which need to be removed to improve operating efficiency of ports.

Inadequacy of Cargo Handling Equipment

16.10.2 Almost all major ports suffer on account of lack of proper cargo handling equipment. For example, in Bombay as, many as 31 of the 53 mobile cranes are 22 years old or above. Modern port equipment, such as, mechanised cranes and gantries, is essential for handling cargo from modern larger ships. Berth throughput is miserably low at our ports for want of efficient handling equipment. We recommend that a special Working Group should be set up to examine availability of handling equipment at major ports and suggest measures for acquisition of new handling equipment.

Inadeqracy of Warehousing and Stacking Facilities

16.10.3 Lack of proper warehousing and stacking facilities severely inhibits cargo handling operations. At almost every major port the back-up area required for smooth port operation is extremely limited. Moreover, inefficient and haphazard use of available area further leads to loss of productivity. A common complaint one hears is that incoming ships have often to wait for days and months together as warehouses and transit sheds in the port have no more space available for unloading new cargo. Kandla port is a typical example.

Inadequacy of Surface Transportation Facilities

16.10.4 The inadequate rail and road transport links have adversely affected traffic handling capacity at many of our major ports. The absence of proper broad gauge rail links to ports like Mormugao, Kandla and Tuticorin restricts growth of traffic at these ports which, in turn, could relieve congestion at Bombay and other ports. We recommend that these ports should be provided with adequate broad gauge rail back-up facilities. Rail capacities have also proved a drag on growth of some intermediate ports like Porbandar in Saurashtra. Narrow road bridges to Cochin and lack of a proper road link betweed Haldia and Calcutta are examples of inadequency of road facitities which have inhabited efficient use of port capacity.

Irrational Movement of Cargo

16.10.5 One of the difficulties to which attention was drawn by the Mehta Committee is irrational movement of cargo, particularly bulk cargo and also, to some extent, general cargo carried in chartered vessels. The arrival and departure of these vessels to our ports is generally controllable by Indian shippers who should never allow these ships to bring cargo for loading at the already congested ports. Moreover, a substantial amount of cargo brought in tramps passes through Bombay port even when it is not meant for consumption there. For example, the total import of edible oil from Malaysia recently made at Bombay was not for the hinterland of Bombay but mainly for eastern region of the country. These imports could have conveniently been discharged at Calcutta, the nearest port to the eastern region. There appears to be no rational justification for allowing such irrational movement of cargo which further adds to cognestion at Bombay.

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* See annexure 16-V.

Draft Limitations

16.10.6 The docks and harbours at all our major ports require to be dredged regularly for maintaining required depths at navigable approaches. The extent of dredging varies from port to port but at Calcutta in particular which has a 203 kms. long channel and 14 bars, maintenance dredging is a difficult problem. The draft limitation at Calcutta has become more acute with the advent of modern ships of larger and still larger sizes. We recommend that appropriate measures should be taken to ensure required maintenance dredging at Calcutta, Haldia and other ports.

Labour Problems and Productivity

16.10.7 As port capacity is direclty related to the level of its labour productivity, which can be improved by better organisation and modernisation of facilities, we lay particular emphasis on the need for taking port labour into confidence whenever schemes are mooted for port modernisation. Compared to ports elsewhere, our ports have a larger labour force for identical operations. For instance, while a sling-handling operation on the Bombay port requires two gangs consisting of 23 men, 13 on the shore and 10 on the board, the same operation is performed by a smaller number of men at Singapore port. Moreover, on the one hand there is an excess of labour for most port handling operations ; on the other, there is an acute shortage of specialized labour, such as pilots and berthing masters, affecting efficiency of port operations adversely,

16.11 Trends in Fort Finances

16.11.1 The major ports have generally the following sources for funds for their development: (a) loans from Goverment, (b) external loans, (c) debentures, and (d) internal resources. The extent to which these sources have been utilised has varied from port to port.

16.11.2 Prior to planning, outlays on major ports were funded through market borrowings and internal resources. With the inception of Five Year Plans the pattern of funding has undergone a change. Market borrowings and external loans which contributed significantly to the port development programme till the Third Plan ceased to be sources of port finances in the subsequent period. Contribution of ports' own earnings has also declined sharply due to an increase in overhead costs. All this has led almost all ports to rely increasingly on Government loans for financing their development programmes.

16.11.3 With the growth of traffic, both revenue income and expenditure have shown an upward trend as is indicated in table 16.7.

Table 16.7

Port-wise Revenue and Expenditure

(Rs. crores)

Port	1973-74		1974-75		1975-76		1976-77		1977-78	
	Total Revenue	TOtal Exp.	Total Revenue	Total Exp.	Total Revenue	Total Exp.	Total Revenue	Total Exp.	Total Revenue	Total Exp.
1	2	3	4	5	6	7	8	9	10	11
1. Bombay	33.33	30.72	39.47	34.11	50.11	39.87	59.47	39.13	63.37	54.79
2. Calcutta	30.59	42.98	42.14	48.26	55.68	54.02	59.16	55.64	59.33	65.06
3. Cochin	4.16	5.56	6.09	6.91	10.51	8.28	12.90	9.30	15.06	14.01
4. Kandla	3.50	3.49	4.80	5.56	7.93	4.16	8.48	7.03	10.41	9.69
5. Modras	12.80	14.91	14 96	18.10	23.05	18.86	23.95	23.68	28.50	27.86
6. Mormugao	3.57	2.67	4.30	3.08	5.59	3.56	6.07	4.50	6.67	6.18
7. Paradip	2.46	5.91	3.96	5.23	7.72	7.45	8.67	9.73	8.56	10.99
8. Vishakapatnam	10.43	8.24	10.88	11.45	17.76	16.98	17.23	22.27	31.67	32.72
9. New Mangalore	-	-	0.11	-	0.76	0.89	1.04	1.49	1.39	1.72
10. New Tuticorin	-	-	0.13	0.04	0.47	0.25	1.05	0.52	1.27	0.82
11. All Ports: (1 to 10)	101.20	114.49	126.84	132.77	179.92	154.32	198.02	173.29	226.23	223.48

Source : Ministry of Shipping and Transport.

16.11.4 Table 16.7 shows that expenditure had increased at a higher rate compared to revenue till 1974-75. This trend was reversed in the following year through corrective steps taken by Government in the form of rationalisation of port charges in the middle of 1975. Consequently, revenue receipts have grown faster than expenditure since 1975-76.

16.11.5 Cargo handling and warehousing account for 55 per cent of total earnings for all major ports. Among individual ports, the percentage varies between 46 for Calcutta and 71 for Madras. The earnings from port and dock dues accounted for 15 per cent of the total for Paradip, 16 per cent for Madras, 19 per cent for Bombay and 31 per cent for Calcutta, against an average of 23 per cent for all major ports. The earnings from land and buildings have varied between 0.6 per cent for Madras to 12.3 per cent for Bombay.

Rationalisation of Port Charges

16.11.6 Port charges constitute one of the most important sources of port income. The viability of ports depends upon the effectiveness of a system of rates and charges to cover working expenses and provide for development of capital assets. In the past ports have revised their charges several times with frequent recourse to imposition of surcharges. We observe that these revisions have been made more or less on an ad-hoc basis, not on any definite principles. The last comprehensive review of port finances and tariffs was made in 1975 when an attempt was made for the first time to fix tariff structure in close relation to port costs.

16.11.7 Despite these attempts towards rationalisation of port tariff structure, there are wide variations in wharfage rates and port dues.* For example, wharfage rate per ton of edible oil is Rs.5.80 at Bombay, Rs.19.46 at Calcutta and Rs.8.80 at Kandla. Similarly, wharfage rate per ton of cement is Rs. 3.50 at Bombay, Rs. 22.11 at Calcutta, Rs. 11.88 at Madras and Rs. 4.95 at Kandla. While discussing reasons for cargo flowing through the Bombay port and not through a port nearer to the origin or destination of cargo, it has been represented to us that wharfage rates at newer ports are higher than those charged at Bombay. The rate differentials more than offset disadvantages in higher inland transportation costs to and from Bombay. This advantage, together with other facilities and conveniences, leads to concentration of traffic at Bombay port.

16.11.8 In 1975-76 the Bombay Port Trust spent Rs .11.09 crores on cargo handling operations, against which its revenue, excluding demurrage fee was only Rs. 5.03 crores. Thus, the port recovered less than 50 per cent of its cost of cargo handling operations, and heavily subsidized this activity through their earnings on account of demurrage fee and surplus generation in pumping large quantities of POL through pipelines.

16.11.9. Port dues on ships handled at Bombay are the lowest at Rs. 0.84 per NRT, as against Rs. 1.50 at Kandla and Rs. 1.80 to Rs.3 50 at Cochin, Madras and Calcutta-Haldia. The lower port dues encourage ships to call at Bombay in preference to other ports.

16.11.10 Demurrage fee is presently charged at Bombay port for all goods remaining uncleared after the expiry of three days and these are regulated on the basis of one full wharfage for each day or part thereof. This basis is anomalous in the sense that if wharfage rate for a commodity is low, demurrage fee for it is also low. For example, the present wharfage rate for cotton is only Rs. 4.80 per tonne (imports) and Rs. 3.80 per tonne (exports), whereas wharfage rate for iron and steel is Rs 8.90 per tonne. On the present pattern, demurrage fee on iron and steel is much higher than on cotton, though logically cotton, which requires greater space and care, should really be chargeable at a higher rate. The level of demurrage fee is significant, particularly in view of severe congestion in the port area and non-availability of space for loading or unloading of cargo.

16.11.11 Perfect uniformity in tariffs may not by possible as ports fix tariffs, keeping in view the type and quality of service provided. But variations in tariff charges between ports is one of the major factors accounting for irrational movement of cargo with concentration at Bombay port.

*See annexures 16. IV and 16. VI.

16.11.12. Port charges must be fixed to cover fully the operational cost at each port. There is no justification for a hidden subsidy in the form of lower port dues, wharfage charges or demurrage fees. On broad commercial principles, port services should be self-sustained. Ports should also be able to build sufficient internal resources for developing infra-structure facilities, improve efficiency in handling of cargo and reduce turn-round time of vessels. It is necessary to ensure that tariffs fixed at low levels at particular ports do not lead to distorted and irrational cargo movement.

16.12. **Port Management**

16.12.1 A port administration is responsible for efficiency of port operations, proper maintenance and upkeep of property, adequate phasing of port improvement, and allotment of tasks to labour. There is a wide variety of practices with regard to ownership and management of ports in the world. In West Asian countries like Syria, Kuwait and Iran, ports are owned and operated by their respective Governments. In the United States these are owned and operated by the Federal Government, State Governments, local port authority, municipality, rail and road corporations and private companies. In the U.K., ports are owned by public authorities, municipality or private companies. In India, major ports are administered under Acts of Parliament. The administration of a port is carried on by a trust headed by a chairman and consisting of trustees representing various interests appointed by Government. The trustees are either official or non-officials. Official trustees represent departmental interests, such as customs and railways. Non-official trustees generally represent trade, shipowners and labour interests. In accordance with the statutes governing major ports, all questions relating to port trust are decided by a majority of votes of trustees present. On financial matters Port Trusts Acts require approval of the Central Government.

16.12 2 Port trusts are conceived primarily to be autonomous bodies. However, there are certain limitations to their administrative and financial powers. Major propoals mooted by the port trusts have to be approved by Ministry of Shipping and Transport. For example, Chairman, Bombay Port Trust, is not authorised to purchase equipment costing more than Rs. 15 lakhs and the trustees worth more than Rs 100 lakhs. In administrative matters Chairman has powers to fill a post carrying a pay of Rs. 2000 p. m. but he cannot fill up the post if the maximum pay exceeds this limit. Consequently, even operational posts lie vacant telling upon operational efficiency of ports.

16.12.3 The procedural formalities, prescribed at present, also at times inhibit efficient operations at ports. Proposals for replacing or acquiring adequate shore handling equipment, for instance, have to go through a long process, thus affecting efficiency.

16.12.4 We recommend that port trusts should be given greater freedom in establishment matters, purchases of essential equipment and contractual work programmes, so that they can take quick decisions. This is essential for improving port efficiency.

16.12.5. We also recommend the setting up of a Central Port Authority which could be charged with the responsibility of overall planning of port development in the country. This Authority could take an integrated view on rationalising cargo movement through appropriate ports and provision of infra- structural facilities with a view to ensuring optimal utilisation of port capacity. The Authority could form part of the Nationl Transport Commission.

16.13 **Role ot Intermediate and Minor Ports**

16.13.1 Ports other than major ports are categorised as intermediate or minor ports. The minor ports which handle or have handled in the past one lakh tonnes or more of cargo per year or are otherwise important are referred to as intermediate ports. The Commission on Major Ports (1970) placed the number of working minor ports at 168, including 23 intermediate ports.

16.13.2 Ports other than major ports are placed in the Concurrent List of the Constitution. The responsibility for their development is that of the concerned maritime State Government. The Central Government, however, renders technical assistance to State Governments for development

of these ports whenever asked for or is considered necessary.

16.13.3 The primary function of a minor port is to serve the needs of its hinterland. With relatively lower port and wharfage charges, minor ports offer substantial advantages. It would, however, be seen from table 16.8 that the share of minor ports in the total volume of port traffic has been declining since 1974-75.

Table 16.8

Volume of Traffic Handled by Major and Minor Ports During 1970-71 to 1978-79

(In million tonnes)

Year	Port Traffic			Percentage share	
	Major Ports	Minor Ports	Total	Major Ports	Minor Ports
1	2	3	4	5	6
1970-71	55.7	6.7	62.4	89.3	10.7
1971-72	59.2	7.2	66.4	89.2	10.8
1972-73	58.2	7.5	65.7	88.6	11.4
1973-74	63.7	8.3	72.0	88.5	11.5
1974-75	65.7	7.8	73.5	89.4	10.6
1975-76	65.4	7.6	73.0	89.6	10.4
1976-77	67.8	6.9	74.7	90.8	9.2
1977-78	66.0	5.5	71.5	92.3	7.7
1978-79 (Prov.)	69.7	5.8	75.5	92.3	7.7

Source : Ministry of Shipping and Transport.

Obstacles to the Development of Minor Ports

16.13.4 The Minor Ports Committee (1973) examined problems of development of such ports. It maintained that sea transport, though the cheapest, could not be so because of difficulties of inadequate depths, double handling, pilferage at minor ports, and telescopic freight rates charged by the railways. The problems of siltation and entrance barriers, lack of berthing and other infrastructural facilities and absence of adequate navigational aids are the major factors contributing to traffic stagnation at minor ports. The emergence of a new traffic pattern in which bulk handling has become more predominant has also adversely affected the role of minor ports.

16.13.5 The Mehta Committee (1978) examined the question of handling diverted cargoes at intermediate and bigger minor ports. It found that, except for Porbunder port in Gujarat, no other intermediate or minor port has alongside berthing facilities for handling deep drafted large ships. Mainly these are roadstead ports, with barges used for ship-to-shore carriage of cargo and they therefore, cannot entertain modern deep-drafted ships carrying general cargo. The Committee also examined the question of allotment of

some quantities of fertiliser imports to minor or intermediate ports and found that available rail capacity would not permit any substantial import of fertilizers at ports in the Saurashtra region. As requirements of imported fertilizers are concentrated in the northern States, quantities unloaded at minor ports in the south have to move over long distances by rail. This is new movement pattern for which no rail facilities had been planned, and there is an overall capacity constraint on movement on south-north rail route.

16.13.6 During our visits to the States and discussions with various interests, we were told that minor ports had fallen into disuse mainly because of inadequate infra-structure like proper jetties, shore handling facilities, warehouses and stacking and internal surface transport links. We are of the view that minor ports are important in meeting requirements of sailing vessels and also, to some extent, in reducing pressure on major ports, provided they have requisite facilities, including proper rail and road links. Minor ports can flourish if some industries are located at such ports.

16.14 Summing Up

16.14.1 The shortage of port capacity and consequent congestion at major ports has resulted in a substantial loss of foreign exchange in the form of demurrage fee paid to shipping companies. It has also affected smooth functioning and development of our economy.

16.14.2 In planning port development, a certain degree of foresight and advance planning is essential because construction of port capacity invariably entails long gestation lags. To this end, it is useful to have accurate and realistic estimates of port traffic as huge amounts of capital investment are involved in port development. A continuous assessment of port capacity in the country is essential both for optimal utilisation of available capacities and future addition to capacities to meet growing needs of the country. A distinction should be drawn between capacity of a port to receive ships requiring different drafts and its capacity to handle cargo at berth with speed and efficiency so as to minimise ship's service time. Port capacity has to be measured in relation to peak demand as maximum bunching occurs on arrival of ships.

16.14.3 By and large, demand for port capacity is location specific, particularly in relation to liner trade. Hence, to draw a proper balance between port capacity and traffic demand, it is more appropriate to relate projected traffic at each port to its available capacity, instead of relating aggregate port capacity of the country to its aggregate demand. The capacity of a port should also be assessed separately in relation to three broad categories of cargo, namely, (a) wet or liquid bulk, (b) dry or solid bulk, and (c) break bulk.

16.14.4 The berth occupancy rate internationally considered optimal is 67 per cent. As against the internationally accepted norms, the present berth occupancy at Bombay port, for instance, is estimated at about 90 per cent which reflects pressure of demand for berths at that port. While the international norm seems to be too liberal in the Indian context, any berth occupancy of over 70-75 per cent must lead to poor port maintenance and hence to a deterioration in the quality of port service provided. Any berth occupancy of over 75 per cent must be avoided in the interest of port efficiency.

16.14.5 The available capacity estimates show that while there may be excess capacity for handling liquid and dry bulk cargo at a number of ports, there is likely to be shortage of capacity for break bulk cargo at practically all major ports. Major shortages of capacity for break bulk cargo may arise particularly at the port of Bombay.

16.14.6 Taking into consideration international developments in the field of sea transport, there is compelling need for development of container berths at selected ports in the country. Such facilities may have to be developed at Nheva Sheva, Cochin and Madras on priority basis. The utilisation of container facilities provided at Haldia can be improved substantially if surface transport system serving the hinterland is strengthened.

(*Annexure-16.1*)

Volume of Traffic at Major Ports

(Million tonnes)

Ports	1950-51		1955-56		1960-61		1965-66		1970-71		1975-76		1977-78		1978-79	
	Vol.	% Share	Vol.	% Share	Vol.	% Share	Vol.	% Share	Vol.	% Share	Vol.	% Share	Vol.	% Share	Vol.	% Share
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Calcutta	7.6	39.6	8.0	35.4	9.4	23.8	9.8	19.2	6.0	10.8	7.7	11.7	7.6	11.5	8.0	11.5
2. Bombay	7.0	36.5	9.4	41.6	14.3	36.2	18.1	35.8	14.4	25.9	16.8	25.8	16.7	25.3	15.7	22.5
3. Madras	2.2	11.5	2.3	10.2	3.0	7.6	4.9	9.7	6.9	12.4	8.2	12.6	8.1	12.3	9.8	14.0
4. Cochin	1.4	7.4	1.6	7.0	2.0	5.1	2.9	5.8	4.8	8.6	4.3	6.5	5.2	8.0	5.4	7.8
5. Vishakha-patnam	1.0	5.0	1.3	5.8	2.8	7.1	4.4	8.7	8.7	15.6	8.5	12.9	3.7	5.6	10.0	14.2
6. Kandla	-	-	-	-	1.6	4.1	2.5	5.0	1.6	3.0	3.2	5.0	9.7	14.6	5.9	8.5
7. Mormugao	-	-	-	-	6.4	16.1	7.8	15.8	11.0	19.8	12.8	19.5	11.3	17.1	10.8	15.5
8. Paradip	-	-	-	-	-	-	-	-	2.2	3.9	3.3	5.0	2.7	4.1	2.1	3.2
9. New Mangalore	-	-	-	-	-	-	-	-	-	-	0.3	0.5	0.4	0.6	0.9	1.2
10. Tuticorin	-	-	-	-	-	-	-	-	-	-	0.3	0.5	0.6	0.9	1.1	1.6
Total :	19.2		22.6		39.5		50.4		55.7		65.4		66.0		69.7	

Source: Ministry of Shipping and Transport.

Annexure 16.II

Composition of Traffic at Major Ports

(Million tonnes)

Item	1950-51 Vol.	% Share	1955-56 Vol.	% Share	1960-61 Vol.	% Share	1965-66 Vol.	% Share	1970-71 Vol.	% Share	1975-76 Vol.	% Share	1977-78 Vol.	% Share	1978-79 Vol	% Share
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. P.O.L	3.1	16.1	6.2	27.4	12.0	30.4	16.4	32.5	18.4	33.0	21.5	32.9	25.4	38.5	27.3	39.2
2. Iron Ore	-	-	0.3	1.3	6.7	16.9	10.5	20.8	19.6	35.2	21.1	32.3	21.0	31.8	20.1	28.8
3. Coal	2.7	14.1	2.5	11.1	2.2	5.5	2.0	4.0	0.7	1.3	1.2	1.8	1.3	2.0	1.2	1.7
4. Fertilisers	0.3	1.6	0.4	1.8	0.6	1.6	1.7	3.3	2.4	4.3	3.4	5.2	3.1	4.7	5.3	7.6
5. Foodgrains	3.4	17.7	0.8	3.5	5.2	13.2	7.5	14.8	3.2	5.7	6.8	10.4	0.6	0.9	0.9	1.3
6. Other cargo	9.7	50.5	12.4	54.9	12.8	32.4	12.4	24.6	11.4	20.5	11.4	17.4	14.6	22.1	14.9	21.4
Total :	19.2		22.6		39.5		50.4		55.7		65.4		66.0		69.7	

Source: Ministry of Shipping and Transport

Annexure 16.III

Traffic by Commodities at Major Ports

(Million tonnes)

Port & Year	Petroleum products	Iron Ore	Coal	Fertilisers including raw materials	Food grains	Other dry cargo	Total
1	2	3	4	5	6	7	8
1. Calcutta							
1950-51	0.70	—	2.10	0.10	0.60	4.10	7.60
1965-66	1.43	1.02	1.37	0.23	1.53	4.26	9.84
1977-78	3.41	0.13	1.04	0.40	0.11	2.46	7.55
1978-79	3.91	0.09	0.84	0.69	0.11	2.34	7.98
2. Bombay							
1950-51	1.60	—	0.10	0.10	1.80	3.40	7.00
1965-66	9.92	0.06	—	0.45	2.84	4.84	18.11
1977-78	9.67	—	—	0.70	0.22	6.13	16.72
1978-79	8.04	—	—	1.06	0.15	6.42	15.67
3. Madras							
1950-51	0.50	—	0.40	0.10	0.50	0.70	2.20
1965-66	0.93	1.16	0.39	0.47	0.95	0.97	4.87
1977-78	3.47	2.32	0.08	0.41	0.05	1.82	8.10
1978-79	3.84	2.95	0.06	0.69	0.17	2.10	9.81
4. Cochin							
1950-51	0.30	—	0.10	—	0.50	0.50	1.40
1965-66	1.04	—	0.19	0.21	0.58	0.85	2.87
1977-78	3.80	—	0.14	0.50	0.04	0.69	5.17
1978-79	3.83	—	0.11	0.67	0.05	0.80	5.46
5. Visakhapatnam							
1950-51	—	—	—	—	—	1.00	1.00
1965-66	2.01	1.09	—	0.14	0.35	0.79	4.38
1977-78	1.73	6.06	—	0.81	0.01	1.11	9.72
1978-79	1.94	5.96	—	0.83	0.10	1.21	10.04
6. Kandla							
1950-51	—	—	—	—	—	—	—
1965-66	0.93	0.02	—	0.13	1.25	0.18	2.56
1977-78	2.75	—	—	0.72	0.15	0.20	3.82
1978-79	4.37	—	—	0.79	0.19	0.52	5.87

(Annexure 16.III Contd.)

Traffic by Commodities at Major Ports

(Million tonnes)

1	2	6	5	5	6	7	8
7. Mormugao							
1950-51	—	—	—	—	—	—	—
1965-66	0.09	7.17	—	0.07	0.04	0.49	7.86
1977-78	0.70	10.25	—	0.02	—	0.31	11.28
1978-79	0.68	9.39	—	0.09	—	0.64	10.80
8. Paradip							
1950-51	—	—	—	—	—	—	—
1965-66	—	—	—	—	—	—	—
1977-78	—	2.20	0.04	0.03	0.03	0.43	2.73
1978-79	—	1.73	0.03	0.07	—	0.33	2.16
9. New Mangalore							
1950-51	—	—	—	—	—	—	—
1965-66	—	—	—	—	—	—	—
1977-78	0.20	0.01	—	0.04	—	0.13	0.38
1978-79	0.34	0.02	—	0.17	—	0.34	0.87
10. New Tuticorin							
1950-51	—	—	—	—	—	—	—
1965-66	—	—	—	—	—	—	—
1977-78	0.35	—	0.02	0.12	—	0.14	0.63
1978-79	0.32	—	0.13	0.26	0.11	0.24	1.06
11. All Ports							
1950-51	3.10	—	2.70	0.30	3.40	9.70	19.20
1965-66	16.35	10.52	1.95	1.70	7.54	12.38	50.44
1977-78	26.08	20.97	1.32	3.75	0.58	13.42	66.12
1978-79	27.27	20.14	1.17	5.32	0.88	14.94	69.72

Source : Ministry of Shipping and Transport.

Annexure 16.IV

Port Dues at Various Ports

Name of Port	Rate of Port dues per NRT
1	2
1. Calcutta	Rs.
Vessels not exceeding 6000 NRT	1.80
Vessels exceeding 6000 NRT	3.50
2. Haldia	
Vessels not exceeding 6000 NRT	1.80
Vessels exceeding 6000 NRT	3.50
3. Paradip	1.50
4. Visakhapatnam	1.70
5. Madras	
(i) Jawahar Dock	1.80
(ii) Bharathi Dock	3.00
6. New Tuticorin	1.50
7. Cochin	1.80
8. New Mangalore	1.50
9. Mormugao	1.80
10. Bombay	0.84
11. Kandla	1.50

Source : Mehta Committee Report on Bombay Port congestion.

Annexure 16.*V*

Number of Ship Days Lost in Bombay Port for Want of Berth

Year	Bulk Carriers	General Cargo	Total
1	2	3	4
1962-63	788	2,191	2,979
1963-64	550	1,689	2,239
1964-65	1,448	3,468	4,916
1965-66	766	1,991	2,757
1966-67	3,224	2,331	5,555
1967-68	1,948	3,345	5,293
1968-69	1,779	1,100	2,879
1969-70	934	1,415	2,349
1970-71	3	187	190
1971-72	256	776	1,032
1972-73	412	1,169	1,581
1973-74	2,325	4,450	6,775
1974-75	2,540	2,683	5,223
1975-76	2,075	542	2,617
1976-77	495	1,224	1,719
1977-78	437	8,910	9,347
Total :	19,980	37,471	57,451

Source : Mehta Committee Report on Bombay Port Congestion.

Annexure 6. VI

Wharfage Rates for Different Commodities

Sl No.	Name of commodity	Unit	Calcutta	Paradip	Vizag.	Madras	Tuticorin	Cochin	Mangalore	Mormugao	Bombay	Kandla
1	2	3	4	5	6	7	8	9	10	11	12	13
			Rs	Rs	Rs	Rs	Rs	Rs	Rs	Rs	Rs	Rs
1.	Coal & Coke	1 tonne	14.19	6.00	3.20	3.96	6.00	6.33	5.75	2.52	3.20	4.50
2.	Food	do	18.17 Imp 15.70 Exp	6.00	7.70	22.44 (bags)	9.00	14.30	19.50	10.00	3.50	7.20
3.	Fertiliser & Manure	do	25.93 Imp 19.24 Exp	6.00	9.00	15.84	4.00	12.87	11.70	10.00	3.50	8.10
4.	Iron & Steel	do	33.92 Imp 26.16 Exp	6.00	10.30	19.80	12.00	20.02	20.00	5.87	8.90	9.90
5.	Oil Cakes	do	19.58	6.00	4.10	8.47	12.00	14.30	11.70	5.00	2.00	3.60
6.	Oil Seeds	do	18.40	6.00	4.50	13.20	12.00	14.30	13.00	3.35	3.20	4.50
7.	Ore - Misc.	do	19.75	8.00	5.80	15.84 Imp	12.00	12.87	7.00	5.87	2.80	18.00
8.	Sugar	do	13.67	6.00	5.50	15.84	12.00	12.87	11.70	2.52	2.50	9.00
9.	Vegetable Oil	do	19.46	6.00	4.60	15.84	12.00	14.30	11.70	3.35	5.80	8.80 (1000 litres)
10.	AC Sheets - Pipes	do	26.16	6.00	10.30	23.76	12.00	17.16	15.60	3.35	7.00	18.00
11.	Molasses	do	19.46	6.00	12.90 (per KL)	17.16	12.00	21.45	19.50	2.52	8.30	7.20
12.	Cotton	1 bale	7.88 Imp 5.07 Exp	6.00	12.90 (per tonne)		9.00	12.87	13.00	5.87	4.80 Imp 3.80 Exp	1.35
13.	Petrol	1 tonne	73.24	6.00	9.60	13.20	12.00		20.80	10.00	18.30 Imp 4.40 Exp	6.30 Exp

(*Annexure 16.VI Conld*)

Wharfage Rates for Different Commodities

1	2	3	4	5	6	7	8	9	10	11	12	13
14.	Crude Oil	1 tonne	—	6.00	16.00Imp 12.00Exp	15.84	12.00	14.30	19.50	5.70	8.00 Imp 1.90 Exp	—
15.	Edible Oil	do	19.46	6.00	4.60		12.00	12.87	11.70	3.35	5.80	8.80
16.	Steel Tubes	do	26.16	6.00	10.30	19.80	12.00	20.02	20.00	5.87	8.90	9.90
17.	Engineering Goods	do		6.00	9.70	22.44 Imp 19.80 Exp	12.00	24.31	22.10	8.39	9.60	15·30
18.	Bones and Bone-Meals	do I CUM	20.93	6.00	4.80	23.76 18.48	12.00 9.00	21.45 17.16	10.40	2.52	3.00	5.40
19.	Food Products-	do	26.16	6.00	7.70	22.44	12.00	21.45	19.50	8.39	5.10	10.80
20.	Cement	do	22.11	7.50	6.50	11.88	8.00	12.87	14.70	3.35	3.50	4.95

Soure: Mehta Committee Report on Bombay Port Congestion.

Chapter 17

Ropeways And Pipelines

17.1 Introduction

17.1.1 Besides the principal modes of transport, discussed earlier, we should examine two specialised modes, namely, ropeways and pipelines.

17.2 Ropeways

17.2.1 More than 16 per cent of the country's area is hilly. High ranges and rapid streams, the latter with frequent changes in their courses, are formidable barriers to development of communications in hilly areas. Long, circuitous routes have to be carved out to avoid heights or cross streams over bridges sited at suitable places. In the interior regions even bridle-paths are rare and all commodities for domestic or other requirements have to be carried in small loads by people. Due o complex geological structure, an efficient transport service in hilly terrain is essential for accelerating development. In this context, construction of ropeways, particularly in steep, rocky and rugged areas, has to be examined.

17.2.2 We were unable to collect precise and useful data for an analysis of operation of ropeways, its earlier growth and decline, and its performance in comparison with other modes of transport. We could, however, get some sketchy information about a few specific ropeway schemes which were or are in operation and for which surveys have been conducted. Before considering the future potential for ropeways, it would be relevant to discuss briefly the historical background and present position of this mode of transport.

Historical Perspective

17.2.3 The Study Team of the Joint Technical Group of the Planning Commission in its report (September 1967) on "Eastern Region Transport Survey" highlighted the need for ropeway system for transporting bulk commodities like sand and coal over distances from one fixed point to another in difficult terrain. Reviewing ropeway system in the region, the study indicated that in 1965-66 there were approximately 145 kms of ropeways with an installed capacity of 2,904 tonnes per hour. These were located in areas situated well apart but mainly concentrated in coalfield regions of West Bengal and Bihar. On the future scope for this mode of transport, the survey observed that it is an ideal means of transporting bulk materials under three conditions. First, the commodity to be transported must be such as can be expeditiously fed into small ropeway buckets. Secondly, the haul should be short, not exceeding 50 kms. Thirdly, other modes of transport are either inadvisable or uneconomical. It was also stated that due to operational difficulties for other modes, ropeway transport will grow gradually in the eastern region, particularly in Jharia and Raniganj coalfields, where surface transport is becoming congested, in iron ore mining areas of Bihar and Orissa, where roads are inadequate and railway connections uneconomical, and in hilly areas which need to be urgently exploited for their mineral wealth or forest produce.

17.2.4 Salient features of some of the ropeways are briefly given below :

Gangtok to Changsu - 12½ kms Long Ropeway (Sikkim)

17.2.5 The ropeway, built in 1963 at a cost of Rs. 32 lakh, did not last long because its operation changed many hands, proved technically defective, and did not permit smooth movement of goods. It became inoperative with the closure of trade route to Tibet and was subsequently handed over to the defence organisation which also did not find it economical to operate after construction of a road in that area.

Kuekhola-Padamchan-Zuluk-Lungthu Ropeway (Sikkim)

17.2.6 It was constructed by "Project Swastik" under the Border Roads Organisation in 1964-65. This ropeway, built for use by the army to transport stores linking terminal points, was designed by Laso Ropeways, Switzerland, and commissioned in 1965. After construction of an alternative road the ropeway was dismantled in stages from 1969 onwards.

Comparative Cost-Analysis of Kuekhola-Lungthu Ropeway vis-a-vis the Road Built in the Area

17.2.7 The two stations, Kuekhola and Lungthu, connected by 5.8 kms of ropeway are also connected by 37.2 kms of road. The cost of construction of 5 8 kms of ropeway in 1964-65 was Rs. 51.5 lakh, that is, Rs. 8.8 lakh per km approximately. The life of the ropeway, according to preliminary report of the Swiss consultant, was put at 15 years. The cost of 37.2 kms of road connecting these two stations at rates prevalent at that time would have worked out to Rs 150 to Rs. 200 lakh approximately, or Rs. 4 to 5.4 lakh per km. According to the authorities the life of a road can be assumed at approximately 45 to 50 years. The anticipated operational cost of haulage by ropeway, estimated in the technical report submitted by the consultant, was Rs. 3.60 per ton km. However, the ropeway could not function at optimum efficiency and the actual cost of haulage worked out to Rs. 12 98 per ton km in 1966-69. The cost of haulage by road transport in the same area during 1969 was approximately Rs. 0.70 per ton km. As road length was six times that of ropeway, corresponding road transportation cost would be about Rs. 4.20 per ton km, as compared to Rs. 3.60 per ton km by ropeway under ideal and Rs. 12.98 per ton km under actual conditions. The ropeway at Lungthu was operated by diesel engines and, as such, the cost of operation by hydel power is not known.

17.2.8 According to the Director General, Border Roads, the cost of ropeway construction was approximately one-third of that of the road but, at the same time, the anticipated life of ropeway was approximately one-third of road life. Further, haulage cost by ropeway under ideal conditions should have been marginally lower than by road but actually it turned out to be much higher. This was mainly because operational efficiency of the ropeway was much below the designed level. The road system also has distinct advantages over the ropeway, as road capacity would be greater than that of ropeway.

Lakkar Bazaar-Jakoo Hill-Passenger Ropeway (Himachal Pradesh)

17.2.9 Himachal Tourism Development Corporation is planning a ropeway at Simla connecting Lakkar Bazaar to Jakoo. Though a feasibility report of this project has still to be prepared, it is estimated to cost Rs. 60 lakh, with a carrying capacity of 30 passengers at a time. It is planned to have two cabins, one set coming down and another going up, each with a seating capacity of 15 presons.

Economic Viability

17.2.10 The rough cost calculations on the basis of 180 days' operation in a year for 8 hours per day, with passenger fare of about Rs. 2, indicate that Simla ropeway project will be economically viable, and will attain break-even stage in the very first year of its operation. As this project will be entirely a passenger ropeway it will be costlier than an industrial ropeway.

Dodra Kawar Area-Rohru-20 kms long Industrial Ropeway and Cableways (Himachal Pradesh)

17.2.11 The International Bank for Reconstruction and Development (IBRD) had conducted a study in 1976 for an aerial ropeway for goods transportation in the Dodra-Kawar area where at present goods are mainly carried by men or as sheep loads and transportation cost is high. According to the study, a mechanically operated aerial ropeway (20 kms in length) for transporting goods with a payload of 1.5 tons, operating at a speed of 7 metres per second or 420 metres per minute, by diesel engine will cost about Rs 36 lakh or about Rs 1.80 lakh per km.

17.2.12 The study also estimated the cost of 20 kms long power driven aerial cableways, proposed to be located in two districts of Simla and Kulu at Rs 84 lakh or, say, Rs 4.20 lakh per km. The cost of transportation using cableways has been estimated at 45 paise per quintal km roughly, whereas the present transportation cost as men-sheep loads is Rs 3.75 per quintal km.

Economic Viability

17.2.13 These ropeways were proposed in the apple belt ot Kotgarh and Patlikuhal for the benefit of apple growers. The proposal, however, was not found economically sound. People in Kotgarh area and Rohru have, however, set up small, gravity type ropeways for transportation of apples at their own cost. The State forest department has also been working with the ropeways system for transportation of timber logs in the rural areas surrounded by deep valleys and rocky slopes.

North-Eastern Area

17.2 14 Under the north-eastern regional plans surveys for five ropeways were taken up as detailed below :

Table 17.1

Sl. No.	Name of the Project	Location
1	2	3
1.	Ichamati-Burnihat	Meghalaya
2.	Aizawa 1-Sairang	Mizoram
3.	Lanka-Garampani	Assam
4.	Naginimara to Borjan for Borjan Colliery	Nagaland
5.	Ukhrul-Liatan-Kangpokpi	Manipur

Ichamati Shillong-Burnihat Industrial Ropeway System-(Meghalaya)

17.2.15 At the instance of the State Government, a survey was conducted for an aerial ropeway system to transport materials from Ichamati to Burnihat via Shillong passing through many important stations. The total length of this industrial ropeway was estimated at 108 kms and construction cost Rs 18.87 crores. The proposed ropeway will be the longest in the world. At present, the longest ropeway in operation is the Comilog ropeway in Belgium-Congo.

17.2.16 As the proposed ropeway system is too long, the State Government decided to survey and instal it in three phases A brief description of the phases, in order of priority, is given in the following table :

Table 17.2

Phase	Section	No. of stations serving	Dist. in kms	Type of system	Estd. cost (Rs. in crores)	Completion time (months)
1	2	3	4	5	6	7
I	Cherra-Shillong	6	42.77	Monocable	6.39	30
II	Shillong-Burnihat	5	52.74	-do-	8.93	36
III	Ichamati-Cherra	4	12.49	Bi-cable	3.55	18
	Total		108.00		18.87	84

Phases I and II are essentially meant for transportation of cement from Cherra to Shillong and from Shilloing to Burnihat; Phase III from Ichamati to Cherra for tranporting limestone, clays and coal.

Economic Viability

17.2.17 Operation and maintenance costs for these phases have been worked out, taking into account inputs like labour, power, lubricants, consumable spares rope replacement, interest on capital cost and depreciation on the assumption of a life span of 30 years. Comparative cost of transportation per tonne by roads and ropeways has also been worked out, as in the table given below, which indicates that the ropeway system will be economically viable :

Table 17.3

Transportation Cost per tonne

(In Rs.)

Phase	By Road	By Ropeway	Saving
1	2	3	4
I	34.00	18.22	15.78
II	42.00	25.31	16.69
III	12.00	11.26	00.74
Total	88.00	54.79	33.21

Industrial Aerial Ropeway from Sairang to Aizawl (Mizoram)

17.2.18 The State Government of Mizoram had a project report prepared for construction of an aerial ropeway system for goods transportation between Sairang and the State Capital, Aizawl.

Economic viability

17.2.19 At present the only means of communication is a roadway suitable for light vehicular traffic. The transportation cost by road comes to about Rs 72 per tonne, but with capital investment of about Rs. 108 lakh and additional annual expenditure of Rs 4 lakh towards maintenance and operation, a monocable ropeway of 50 tonnes-hour capacity will bring down the figure to Rs 21 per tonne.

Technical Feasibility

17.2.20 Initially it was intended to explore the possibility of construction of a passenger-cum goods transportation system. It was, however, found that such a project would not be economical because of its higher cost. A passenger ropeway would cost at least three-to-four times that of the industrial ropeway. As such scope of the study was restricted to goods transportation only. The feasibility of proposed industrial ropeway system as per technical specifications, is explained in the following table :

Table 17.4

System	- Mono-cable
Capacity	- 50 tonnes per hour
Speed	- 3.0 m per second
Length	- 11.2 kms
Material to be transported	- General mechandise, petrol, kerosens and logs.
Difference in level between the terminals	- 750 metres (Approx.)
Net payload of each carrier	- 500 kgs (Approx.)
Carrier spacing	- 108 metres
Time interval between two carriers	- 36 seconds
No. of carriers on line	- 208 Nos.
Addl. carriers	- 10 Nos.

Ropeways in Mundaneshwar, Mawadhar and Kandarpani Area in Pauri Garhwal district (U.P.)

17.2.21 According to the study, (conducted in 1973 at the instance of the Rural Electrification Corporation), this scheme falls in the milkshed area of Satpuli dairy project, where expected milk collection in chilling plants at Mundaneshwar and Kandarpani in 1979 and 1984 will rise from 6,000

to 9,000 litres. An orchard covering an area of 355 hectares in the Mundaneshwar cluster is also proposed. These development programmes are possible only if the area is accessible. At present there is no market centre in it and people go to Satpuli for marketing and other facilities. They travel by ponies and collect foodgrains and goods from Satpuli, covering a distance of more than 15 kms. There is, however, hardly any possibility for construction of a road within a reasonable cost. Moreover, cutting of steep slopes may lead to land slides. As an alternative mode of tranport, an aerial ropeway has been recommended for this mountainous terrain connecting Mundaneshwar and Satpuli. The proposed ropeway will serve 59 villages scattered in three clusters, namely, Mundaneshwar, Mawadhar and Kandarpani. The 1971 population of these villages was estimated as 6,900 and the projected population in 1979-1984 will rise to 7,700 and 8,200. In addition to passenger traffic, the ropeway will carry foodgrains, fruits vegetables and chilled milk from chilling plants at Mundaneshwar and Kandarpani to Satpuli.

Technical Norms

17.2.22 The aerial ropeway proposed between Mundaneshwar an Satpuli will have a capacity of 1.5 tons, both uphill and downhill. It will connect three intermediate stations, namely, Mawadhar, Kandarpani and Dabnu. The total length of the ropeway will be 11.6 kms with two sections, Mundaneshwar to Kandarpani (5.5 kms) and Kandarpani to Satpuli (6.1 kms). Each section will have two rope cars travelling simultaneously in opposite directions. The ropeway speed will be 12 kms per hour, including stopover at intermediate points. The journey time for each trip will be 1 hour 30 minutes. Assuming that the ropeway will work for 12 hours a day (excluding intervals) the total number of trips in one direction will be 16. The requirement of electricty to operate the ropeway will be 25 hp.

Estimated Passenger and Goods Traffic

17.2.23 The ropeway will carry both passengers and goods. Each carrier will have a capacity of 750 kgms and will carry six passengers and about 300 kgms of goods at a time. Considering the large quantity of milk to be transported from Mundaneshwar and Kandarpani to Satpuli, it is proposed that at least four trips in a day should be reserved for milk transportation between these points. In addition to four trips, the total passenger traffic per day is estimated at 1950 (28 x 6 x 11.6) passenger kms. Assuming the average weight of goods to be carried along with passengers as 300 kgms, the goods traffic will be 97.5 tonne kms. Adding the four trips proposed exclusively for milk tranportation (34.8 tonne kms) the total goods traffic will be 132 2 tonne kms.

Economics of the the Proposed Ropeway

17.2.24 For a length of 11.6 kms construction cost of the ropeway will be Rs 40.85 lakh. In addition, an annual maintenance cost (including electricity) of about Rs 1.2 lakh will be required. Assuming that the ropeway will work throughout the year, the total passenger kms per year will be 7.1 lakh. At the rate of 15 paise per km, collection of passenger fare will be Rs 1,06,500. At a tariff of Re 1 per tonne km the annual goods traffic of 48,200 tonne-kms will yield a revenue of Rs 48,200. The combined collection of passenger and goods fare in a year will be Rs 1.54 lakh. Thus, annually there will be net return of Rs 34,000 over recurring cost.

Summing up

17.2.25 We hold the view that, commensurate with the substantial strides made in the recent past in the field of horticultural and cash crops in the hilly regions, appropriate and efficient transport services have not been provided so far. In steep valleys and rocky slopes, where means of communications are scanty and road construction involves exorbitant cost and is time econsuming, suitably designed power-operated ropeways can contribute significantly to development of the area. Most hilly areas are so located that as the crow flies the distance may be just a kilometre or two but cost and time in road travel will be much greater in comparison to ropeways.

17.2.26 while ropeways has a distinct advantage and its advantages can be pronouncedly felt in hilly areas, we are of the view that it can be functionally useful in selected plain areas as well. For instance this mode of transport can be gainfully utilised over short distances or small stretches, where close circuit movement of bulk materials like cement, coal, clay, limestone and clinkers is

hazardous. Such aerial ropeways can provide cheap, convenient and economical means of transport and their operations in such areas will result in easing and reducing the pressure on rail and road tranport systems.

17.2.27 We feel that in view of acute oil shortage this mode of transport can prove more economical than road transport, particularly in hilly terrain. But it is difficult to make any definite and specific recommendations on potential for ropeways as a mode of transport because of limited data available from the present studies. However, on the basis of evidence given to us and material furnished by State Governments and other agencies in response to our questionnaire, we believe that this mode has significant potential for meeting transportation requirements, specifically in selected hilly tracks where roads cannot be constructed conveniently, speedily and at a reasonable cost.

17.3 Pipelines

17.3.1 Pipeline, a comparatively new mode of transport, is most suitable for bulk movement of liquid and gaseous consignments over long distances. It has gained significant importance in some advanced countries of the world. For example, in U.S.A. the share of pipelines in total traffic movement has jumped from about 12 per cent in 1950 to 24.8 per cent in 1975. In the Federal Republic of Germany, the share of this mode of tranport increased from about 2 per cent in 1960 to 6.8 per cent 1975. Similarly, in the Soviet Union within ten years (1965-75) its share increased 2.5 times, from 6.3 per cent to 14.9 per cent.

17.3.2 Traditionally, pipelines have proved to be most convenient for transporting petroleum products and gases. In recent years, however, certain other commodities like coal have also been carried by this mode. In fact, any material which can be broken into small pieces and suspended in a liquid can be transported from one point to another through a pipeline. The preparation of solids for tranportation through pipelines and their reclamation at the other end. no doubt, involves additional cost but technological advances may overcome some of these problems.

Specific Advantages

17.3.3 The feasibility of pipelines for developing countries lies in its ability to traverse even the most difficult terrain, to be practically unaffected by weather, and to furnish transport of petroleum and petroleum products at low unit costs Where volumes are sufficiently high, the pipeline is more economical than other forms of transport. Land costs are also kept to a minimum by burying the pipe three feet underground or deeper to avoid interference with other land uses. The substantial part of expenditure on a typical pipeline system, including installation, is the cost of pipe itself. The operating cost of pipe line is very low, compared to capital cost of the pipeline.

17.3.4 Unlike other modes of transport, an advantage of the pipeline system is its relatively easier and routine nature of operations. Skilled personnel is required only for periodical maintenane and inspection. Maintenance of such a pipeline is inexpensive and movement of product continuous. There is no problem of return of empty containers to loading points as in case of other modes of trnsport. Transit losses which are inescapable in other modes of transport are minimised and considerably reduced.

Pipelines in India

17.3.5 In India pipelines move water, crude oil, POL and gas. Commercial pipelines are mainly owned by the Indian Oil Corporation (IOC), Oil India Limited and Oil and Natural Gas Commission responsible for offshore pipelines. A list of pipelines along with their lengths and other details is given in table 17.5 on page 337.

17.3.6 Pipelines are also being considered in India for movement of iron ore in slurry form from Kudremukh iron ore mines in Mysore for export through an offshore terminal at Mangalore. Studies conducted by Engineers India Ltd. have established the advantage of transporting iron ore in slurry form, both from Kudremukh to Mangalore port and from Bailadilla iron ore mines to Visakhapatnam. The pipeline from Kudremukh to Mangalore has since been constructed and is ready for operation. The Fuel Policy Committee also noted that coal slurry pipelines are more suitable to thermal power stations, fuel requirements of which are fairly large and constant.

Table 17.5

Crude Oil Product, and Gas Pipelines (Over 50 Kms)

(As on 1.4.1979)

Pipelines	Owned by	Length (in Kms)	Diametres (in inches)
1	2	3	4
I. **Crude Pipelines (Onshore)**			
Nahorkatiya-Gauhati	OIL	504	16"
Gauhati-Barauni	OIL	866	14"
Ankleshwar-Koyali	ONGC	94.8	16"
Nawagam-Koyali	ONGC	77.6	14"
Salaya-Viramgaum	IOC	275	28"
Viramgaum-Koyali	IOC	141	18"
II. **Crude Pipeline (Offshore)**			
Platform 'F' to Uran (Bomby High)	ONGC	203	30"
III. **Product Pipelines**			
Gauhati-Siliguri	IOC	425	8-5/8"
Barauni-Kanpur	IOC	668	12-3/4"
Haldia-Barauni	IOC	524	12-3/4"
Koyali-Ahmedabad	IOC	115	8-5/8"
Haldia-Mourigram-Rajbandh	IOC	270	12-3/4"
IV. **Gas Pipelines (Onshore)**			
Ankleshwar-Baroda	ONGC	96.6	14"
V. **Gas Pipeline (Offshore)**			
Platform 'F" to Uran (Bombay High)	ONGC	203	26"

Economics of Pipeline

17.3.7 The cost of pipeline and its installation, generally constitutes more than 70 per cent of the total cost. A peculiar feature is that the cost of pipelines does not increase proportionately with its size. Secondly, pipelines capacity increases much more than a proportionate increase in size. Because of these two reasons pipelines operation has rich economies of scale, and movement of commodities in bulk over long distances is most economical. The capital cost of pipelines is high but its low cost of operation makes it financially viable. Movement of crude from point to point and in bulk is more economical by pipelines than of products to be transported in moderate quantities to a number of points. The consumption of energy by pipelines is lowest as compared to other modes.

17.3.8 The eastern region transport survey team of the Joint Technical Group of the Planning Commission carried out a study in 1967 on comparative movement cost of petroleum by rail, road and pipeline. According to this study, the unit costs were :

Mode	Unit Cost
Pipeline	1.0
Rail (B. G)	1.5
Road	5.0

The study indicates that the pipeline is the most economical mode of transportation of petroleum products, provided there is full utilisation of capacity.

17.3.9 In 1972 the Transport Division of the Planning Commission had undertaken a study of choice of appropriate mode of transport for movement of crude of oil from Nahorkatiya Rudrasagar oilfields to Bongaigaon refinery. In this study, in addition to pipelines and rail, inland water transport was also one of the modes from amongst which the choice was to be made. The pipeline was found to be the cheapest mode, both financially and from the point of view of cost to the economy.

17.3.10 Recently a study conducted by the Planning Commission regarding Mathura-Delhi-Ambala-Jullundur pipeline indicated that movement of petroleum products from Mathura refinery by pipelines is most economical, compared to the next possible alternative of rail. In this analysis, no additional investment in rail track capacity has been taken into account. The study showed that capital investment is heavier in pipelines compared to rail. The major saving in pipeline arises out of lower operating costs which more than compensate initial heavy capital cost. The study also revealed that pipelines option offers scope for low cost expansion of capacity.

Summing Up

17.3.11 We find that pipeline is a significant mode in view of its advantages in transporting selected commodities, particularly oil and gases. It can also be used for solids like coal. Some studies have already established its comparative cost advantage for specified commodities. This advantage is now likely to be higher in view of oil price hike. An increasing use of pipelines for transporting materials will not only conserve energy resources ; it will also relieve pressure on surface modes of transport in certain regions of the country.

Conclusion

1. Our assessment of requirements of transport capacity up to 2000 A.D. is broadly based on a set of assumptions of growth rate and present trends in the national economy. By any standards, the magnitude of work involved in creating adequate capacity to meet these requirements is stupendous. We are convinced that transport is a vital infra-structural facility for sustained economic growth even for development of such core sectors as power and irrigation, and that inadequacy of transport, leading to bottlenecks, distorts the entire range of economic and social activity and causes overall shortages. We, therefore, feel that transport development should be given greater attention on a priority basis than it has received so far.

2. The inter-modal mix we have proposed is based on minimum resource cost taking into account such relevant factors as fuel shortage and constraint on financial resources. This mix is in the nature of a broad guideline. Spatial and commodity variations may occur from time to time. We also realise that there is always an element of uncertainty in all projections for future planning.

3. An overriding consideration in today's context is to encourage modes which are more energy efficient, particularly those which consume either little or no petroleum-based fuel. Transport planning should, therefore, aim at optimum energy conservation, and measures geared to this objective should be encouraged and strengthened. In line with this objective, we have recommended increased use of electricity for motive power, which is particularly suitable for railways on major trunk routes, metropolitan areas, ropeways, pipelines, trolley buses and trams. Utilising primarily coal and hydel resources, both indigenous, electricity should be preferred as it is not dependent on petroleum-based energy sources.

4. For conservation of petroleum products, we have recommended larger role for railways and encouragement of such modes of transport as inland waterways and coastal shipping, even though these may need financial assistance from Government, and traffic on waterways may be only a fraction of the total transport effort.

5. We recommend that transport pricing should be cost based and to the extent possible indirect or hidden subsidies should be avoided. Subsidies needed for special reasons for a particular mode or geographical area, such as the north eastern region, should be direct and explicit.

6. We have underscored the need for development of roads in rural areas as part of the integrated rural development programme. We have also referred to improved designs for bullock carts and other animal-drawn vehicles which will continue to be an important means of transport for years to come in rural areas.

7. The problems of transport co-ordination are extremely complex. Co-ordination is essential not only for agencies within the Government but also between Government and private sector, as almost the entire freight haulage by road is with private operators. Our recommendation for constitution of a National Transport Commission, therefore deserves examination.

8. The principal modes of transport will continue to be by rail and road. Railways cannot reach every part of the country while roads have the advantage of being more extensive and providing door-to-door service to users. In an integrated transport system each mode is complementary to the other. There is likely to be little real competition between modes because of the nature of commodities for movement and the geography involved. As requirements of transport capacity will continue to grow in future, there is a potential for developing all modes of transport according to their comparative resource-cost advantage.

9. We also hold the view that employment generation cannot play any part in the determination of the best inter-modal mix. More important considerations are the type of service required, its efficiency and the resource-cost at which it is provided, including cost of energy.

10. For achieving the best inter-modal mix, appropriate investment decisions and use of the pricing mechanism should have preference over regulatory measures and controls.

11. We find that there are serious gaps in the data base for the transport sector. For any systematic planning it is necessary that our data base is strengthened and regularly updated.

12. As there is a close interaction betwee transport and spatial distribution of economic activities, transport development can be an important instrument for dispersal of industrial activity. It has however, a limited role in dispersal of population from urban conglomerations. To achieve this objective creation of employment opportunities in rural areas and smaller towns is necessary. This in turn will help reduce pressure on the national transport system.

13. We do not foresee in the next two decades any major technological break through for substitution of diesel. motor spirit and aviation fuel in transport. To the extent that rail, road and air transport have to depend on petroleum products, their requirments must not be allowed to suffer and they should get their due share of fuel.

14. We once again express our thanks to all concerned in helping us in preparation of this Report.

B.D. Pande	Chairman
P.C. Lal	Member
G.P. Warrier	Member
F.P. Antia*	Member
M.Q. Dalvi	Member
S.P. Bagla	Member-Secretary

New Delhi

March 28, 1980

On behalf of P.C. Lal, G.P. Warrier, F.P. Antia and myself, I have special pleasure in placing on record our deep appreciation of the hard work with conspicuous ability put in by Dr. M.Q. Dalvi and Shri S.P. Bagla in guiding the various studies and in the preparation of this Report.

New Delhi

March 28, 1980

B. D. Pande

* Subject to a note of dissent.

NOTE OF DISSENT BY DR. F.P. ANTIA

1.1 It has been a rare privilege to work on the National Transport Policy Committee constituted by the Government of India, under the Chairmanship of Mr. B D. Pande. Let me begin by recording my deep appreciation of the many courtesies and indulgences extended to me by the Chairman, the spontaneous co-operation and understanding of my colleagues and the ready, willing and courteous assistance of the Member-Secretary, Mr. S.P. Bagla and his able team of advisers. Just the same I am constrained to file this note of dissent, in which I record some views, which differ from those of my colleagues on some points with respect to (i) Optimal inter-modal mix, (ii) Taxation, (iii) Freight equalisation, (iv) Road transport and (v) Urban transport.

2. Optimal Inter-Modal Mix

(Chapter 3 of the report)

2.1 Let me state briefly the approach to optimal inter-modal mix and the conclusions of the report thereon. A resource costs analysis was made on the basis of the findings of RITES survey. The role of employment generation in determining an optimal inter modal mix which the committee was required specifically in its Terms of Reference to "keep in view" was considered irrelevant. Though an issue of relatively recent origin, and hopefully of short term duration, energy crisis was given over-riding importance suggesting that energy-efficient modes of transport should be assigned a preponderant role. The present share of rail and road in inter-regional freight traffic in terms of tonne-kms is 82.2 : 17.8 (Annexure 3.9.). The break-even points of inter regional traffic (a region has been defined roughly as a revenue district) based on resource costs are expected to shift, in favour of rail, with increase in the price of diesel. To conserve fuel, such traffic, according to the report, would have to be "allocated" to Rail. Assuming only "allocation" of 50 per cent of inter regional traffic moving beyond break-even levels, it is hoped to alter the proportion of rail and road inter-regional traffic to 98.5:1.5 (Annexure 3.9.).

2.2 Assumption IV in Annexure 3.9 visualises a 50% increase in the price of diesel over the 1979 price and an allocation of only 50% road traffic beyond break-even points, as due to various reasons such as non-availability of rail transport in hilly and remote areas or break of gauge on railways, 100% allocation would not be possible. Let us examine the transfer of traffic from road to rail under assumption IV, compared with existing modal shares. The inter modal mix sought to be achieved, embodies transfer from road to rail of inter-regional traffic of not only bulk commodities like coal, iron ore and cement, but also items like fruits and vegetables, provisions and household articles. To take up non-bulk goods, currently 74% of fruits and vegetables inter-regional traffic moves by road. This will be reduced to 3.8%. In the case of provisions and household goods, from the present 78.7%, the share of road traffic will drop down to 5.9%. At present 59.6% of building materials move by road. This will be scaled down to 22.2%. The share of road in into-regional traffic of stones and marbles is 36.4%. That will go down to 2.9%. In the case of wood and timber the share of road transport is expected to drop down from 33.8% to 2%. The net result would be the aggregate share of inter-regional traffic by road which stands currently at 17.8 per cent will be slashed down to 1.5 per cent.

2.3 This "Inter-modal mix" suggested by the Report rests on the RITES survey and the resources costs computed therefrom. The RITES survey, an admirable study, has some in-built characteristics which must not be forgotten. To RITES a "region" is generally a revenue district. The survey is complete and invoice-wise in its reckoning of rail traffic, whereas for road transport it is based on a sample of vehicles intercepted on highways for a couple of days. So like is not compared with like. It would naturally not take into account the fact that practically every

seven and-a-half tonne pay load vehicle in fact carries today over ten tonnes. Reckoning at pay load capacity of seven and-a-half tonnes the resource cost per tonne km is naturally grossly exaggerated. The resource cost of road transport would increase also because of poor roads and administrative barriers. Again it is based on 100 per cent utilisation of capacity on the onward journey but from 0 to as much as 30 per cent empty return journeys. To the extent these assumptions may not mirror reality, the resource cost of road transport is inflated. Just the same the RITES survey has thrown up interesting findings. The average lead of railway was 806 kms and that of road transport 354 kms., which is the legitimate sphere of this mode. In terms of tonne-kms of freight road transport's share was 17.8 per cent and that of rail was 82.2 per cent. From this information it is clear that the present inter-modal mix is influenced by due consideration of appropriate costs and service characteristics of these modes of transport.

2.4 The resource cost is a statistical abstraction based on operator cost and user cost with certain adjustments. Normally social cost too would have to be added, e.g. those caused by pollution, policing and accidents; but in the present case they have been excluded. I submit that objective rating of social costs together with social benefits alone can present a balanced picture of resource costs In a country like ours social benefits, such as massive employment generation, facilitating percolation of technical skills, aiding education, public health and other welfare programmes, serving adminstrative, political and defence objectives, all of which road transport yields abundantly, cannot be left out of any meaningful computation of resource costs. The resource costs so computed alone can provide insights into the anatomy of real costs. Also the report itself (para 3.1.1) states that the resource cost cannot be measured in isolation from the Government's socio-economic priority objectives and financial constraints. It is difficult not to perceive the damage done to breakeven point by not working out the net result of social costs and benefits. In excluding them this computation of resource costs has been denied the desirable impact of the economic priorities of the Government as well as our social realities. The resource cost by its very nature is dominated by the dependence of road transport on HSD and the present crisis in availability and price of crude. But already feverish research is being carried on in several countries including our own, to evolve blends and substitutes. Annexure I outlines some of these. To base large, lumpy investment in long term projects characterised by lengthy gestation periods, increasing dependence on one mode of transport and artificially (though through price and investment mechanisms) pegging down the natural rate of growth in another, would leave permanent distortions in and damage to the transport sector in the country.

2.5 The energy crises has dominated the thinking in the report. Its approach to inter-modal mix is justified on the plea that the demand for diesel for rail and road based on their forecasts of traffic and suggested inter-modal mix comes to 14.7 million tonnes as against 23 million tonnes indicated as optimal level forecast by the Working Group on Energy Policy. On current prices this is expected to yield a saving of Rs. 1650 crores (para 3.7.5). Besides undue pessimism seems to have informed the report about the possibility of "major breakthrough in technology in the foreseeable future to replace petroleum products for traction in the transport sector" (para 3.7.6). I have circulated to the members of the Committee my views on "Energy Crisis and Road Transport" in two notes which are appended to this Note as Annexure II. As the demand for HSD by the road transport sector is rooted in productive activity considerable emphasis should have been laid on fuel conservation. The report has recorded that the consumption of HSD by road transport declined from 78.80% of the total in 1974-75 to 69.97% in 1977-78 which is, indeed, creditable (Table 11.6, chapter 11). feel that on fuel conservation by road transport, as also on R & D on evolving an alternative fuel, much greater attention was indicated than that paid by the report. An opportunity to initiate a national movement for conservation of P.O L. or substitution thereof in road transport has been missed. In its enthusiasm for an optimal inter-modal mix, attention is concentrated on advocating a strategy, the result whereof would not be very different to that achieved by the Motor Vehicles Act 1939 in confining road transport to the tiny fragmented areas of a "region", i.e. generally the distances covered by a single revenue district. It may be recalled that this was sought to be repeated by the Code of Principles that the Railways tried to put across in the 'Fifties, but without suc-

cess. Road transport is sought again by this 'allocation" to be confined caged and cribbed principally to small areas of the size of a district in which it can ply as intra-regional traffic.

2.6 In the chapter on road transport the report has made a very commendable suggestion in para 11.6.10 & 11.1.15 against freezing the number of national and zonal permits at current level which is pre-determined figure, provided full taxes applicable to each participating state are paid and collected at a single point in the home State. In regard to the proviso regarding taxation I shall reserve my remarks to a later stage. Suffice it to state here that this liberalisation of the number of inter-State permits—which after 41 years of the operation of Motor Vehicles Act of 1939 comes to road transport as a breath of fresh air—will be neutralised by the operation of "allocation" under optimal inter-modal mix.

2.7 There is another aspect to the question. Over 66 per cent of our export cargo, by value excluding ores, move to the ports by road. Interpreting this finding the Operations Research Group, Baroda noted :

> "Viewed in a broader sense, the heavy dependence of India's export earnings on road transport is not at all limited to the specific movement over the road to the ports, for the materials and parts and components of those export goods had to move from one site to another, from one plant to another, in the production process ; and road transport must have played a key role in that movement also. A decentralised and widely dispersed industrial structure is especially dependent on speedy and efficient movement from one plant to another, and this dependence must rest heavily on the inherent flexibility of over-the-road, start-anywhere, go-anywhere transport."
>
> (Study of Domestic Transport of India's Export Cargo by Operations Research Group, Baroda, p. 40)

Curtailing the normal and natural growth of road transport in inter-regional hauls or using the price mechanism to discourage such hauls by road on a discriminatory basis will deal a severe blow to India's export endeavours. The process of conserving fuel should not result in much larger and permanent loss to our buoyant foreign exchange earnings through reduced exports or mark-ups in pricing of our exports.

2.8 It would have been genuinely constructive for the development of road transport if the Report had investigated fuel consumption standards that may be set for automobile manufacturers to attain in their present and future production of motor vehicles. It has left the matter to the DGTD to "receive urgent attention". One can only hope that the DGTD comes forward soon with appropriate norms of fuel consumption for different motor vehicles (para 11.10.3).

2.9 Similarly on research for evolving a better and far more efficient automotive engine the Report could have suggested liberal funding for time-bound and results-oriented research. But the scheme of "allocation" of traffic appears to have dominated the approach. It is a solution applicable to countries with well developed railway systems operating efficiently, with unutilised capacity and capable of taking additional loads of the shoulders of one agency of transport and placing it on another without generating new bottlenecks or crises. Is this a creative or practical solution for a total transport starved economy ? The report inself observes that the transport sector experienced bottlenecks and "capacity-shortages" resulting in supply and demand imbalances inflicting suffering and inconvenience to the travelling public and adversely affecting the "country's development programme" (paras 2.5.1 to 2.5.5).

2.10. The recommendation of the optimal inter-modal mix overriding the objective of employment generation, on the plea of "severe energy crisis" and the stated aim "to develop technologically as efficient a transport system as possible" (para 3.8.1) marks a basic difference in approach between my colleagues and myself. The report states that it will be "sensible not be mix up" the objective of employment with the issue of choosing an efficient transport system for the country, while allotting funds between various agencies of transport. In the earlier paragraphs of this Note and more elaborately in Annexure II to this Note, I have set out my views on how to react constructively and in a balanced manner to the energy crises.

2.11 The report discloses that road transport

freight haulage sector creates 3.94 times employment per lakh of rupees invested compared to rail while road transport passenger haulage operations generate 2.15 times the rail employment for similar investment. On the other hand road programmes generate 6.28 times the employment generated by an equal investment in rail (Table 3.25, chapter 3) After labouring hard to uncover these facts the report summarily dismisses them from guiding policy and records. "These findings have thrown up no surprise. We reiterate our view that employment generation however important it may be as a policy objective, has no part to play in determining an optimal inter-modal mix. The more important considerations are the type of service required and the resource cost at which it is provided including energy cost".

2.12 This is a classic example of disregarding the mandate contained in the terms of references which can bear quotation :

> "To propose a comprehensive national transport policy for the country for the next decade or so, keeping in view the objectives and priorities set out in the five year plan".

The very first objective of 1978-83 plan is

> "(i) *The removal of unemployment and significant underemployment*"

Let the report does not heed this objective with susfficient emphasis, the terms of reference reiterate it as follows :

> "In formulating such a policy the committee will recommend an optimal inter modal mix of different systems and also suggest appropriate technical choices within each system *keeping in view the need to generate maximum employment potential*" (emphasis mine).

Would not the objectives and priorities so forcefully mentioned in the plan and expressly reiterated by the G.R. appointing the committee be considered binding on the committee ?

2.13 Stating that employment generation is a non-efficiency objective (socio-political) my esteemed colleagues have rationalised this inter-modal mix scheme which will inevitably result in thwarting of gainful, additional employment opportunities that would otherwise have been generated. It is endeavoured to emphasize that labour-intensive agencies of transport may be less efficient and may tend" to jeopardise the whole production and employment generation programme of economy". This may be considered by some as tendentious. Road transport which scores over rail in respect of employment-generation is admittedly no less efficient ; apart from having other plus points not offered by rail, road transport possesses proved superiority in respect of employment generation. While I do not wish to enter into a road Vs. rail controversy, I find it difficult to appreciate that we should think of an inter-modal mix free from an appreciation of social costs and benefits and alienated from the national policy of promoting employment. The inter-modal mix scheme presented by the report is thinking only of wresting traffic from road transport against the stated preferences of the users. If a mode of transport offers high customer service level and is simultaneously employment-rich, there is no justification for by passing it in allocation of investment funds, although scarcities of fuel such as the present one should be met through judicious use of the price mechanism.

2.14 To rule out competition, the Report puts forward the analogy of a system approach, wherein parts complement but do not substitute (para 1.7.2). Theoretically attractive, this does not bring out the reality fully). No doubt the transport services are by and large complementary to one another. But there is a small measure of substitutability also, if only on the margin. This is dictated by users' preferences, price of transport services and factors such as service characteristics and efficiency. Such competition on the margin acts as a spur to efficiency, stimulant to innovations and growth. Its benefits outweigh costs. Without elbow room for experimentation, innovation and willingness as also freedom for taking calculated risks and facing reasonable uncertainties, the inter-modal mix, however appropriate in the begining. will soon become, rigid and groovy. The modes of transport have to be flexible and there is every benefit to the economy if they compete on the margin, within the framework of overall constructive policy suitably adapted to face the energy crises in pursuit of rendering better service to the user.

2.15 My opposition to this pattern of intermodal mix rests on the following grounds :—

(a) This scheme of inter-modal mix is based

on resource costs computed without including social costs and benfits. Further such studies in a fast-changing scenario, may prove less than adequate for formulating long-term policy and investment. Once the damage of investment famine is done to road transport, it will spread to automobile and auto-ancillaries manufacturing industries leaving us with a recession in hand. A recession can never be localised. It spreads.

(b) The strategy for energy must necessarily include redoubled efforts to earn more foreign exchange. To the extent road transport is downgraded and restricted efficient domestic transportation of India's export cargo will be dealt a severe blow. Would that promote our exports or foreign exchange earnings ?

(c) The presumption that traffic can be shifted from road to rail or vice versa ignores the fact that certain cargo such as fruits, vegetables, flowers and other perishables will not move at all in the absence of road transport facilities. By stunting road transport, the inter-modal mix suggested will deny to the economy net additions to mobility and the consequent additional economic values to be generated.

(d) Any scheme of inter-modal mix that will not conform to overall national objectives and priorities will become an exercise in irrelevance and futility. The report has suggested a mix over-whelmingly dominated by energy consideration -- ruling out the possibility of new oil discoveries and breakthroughs in evolving blends and substitutes—and disregrarding national economic objectives like the imperative need to promote employment

(e) The RITES study has revealed that the present distribution of bulk inter-regional traffic is heavily weighted in favour of rail. This is rightly so Although point to point, rake loads of bulk traffic moving over long distances alone are profitable to and can efficiently be transported by rail, the railways still retain the right to haul non-bulk, less-than rake loads, even less than wagon loads, over short distances too. Similarly non-bulk truck loads of road traffic for any distance would have to be permitted, though long distance road hauls of bulk goods would be priced out by rail. However more often than not, only under compulsions of non-availability of rail facility long-distance traffic of bulky goods has to take to road. By "allocation" of such traffic to rail, rail capacity or efficiency cannot be increased overnight. The result will be that this chunk of traffic will fall between two stools and will not be carried at all. This will adversely affect economic activity and the momentum of growth.

(f) The suggested inter-modal mix has presumed total substitutability between road and rail in inter-regional transportation. It has ignored product differentiation between the services of road and rail Besides road transport contributes substantially to the exchequer by way of taxes, nearly five to six times in aggregate. In the context of the exchequer's requirement of funds, this is a very significant factor. Yet the inter-modal mix scheme is wholly uninfluenced by this.

(g) The worst casualty of this scheme of inter-modal mix is the freedom to the user of transport. Unless guided by allocations, he is believed to be irrational in selecting the means of transport for his shipments. The scheme extinguishes his freedom of choice by limiting availability, in inter regional transport, to a single mode-the railways. Investment decisions and pricing will gradually make his dependence on rail, total.

2.16 New imbalances in supply or pricing out road transport would affect adversely the pace of development, efficiency of public distribution of essential commodities, economic integration of the country, industrial dispersal, exports and modernisation of agriculture. Effective allocation of present road traffic to rail can be achieved only through improved service efficiency and ready availability. While use of price mechanism in securing diversion of traffic may have to be resorted to, it should be done with utmost care and caution,

However meddling with investment in roads and road transport to achieve such ends merits unqualified opposition, Our reaction to oil crisis would have to be balanced and circumspect. The demand for oil is essentially a demand for the function it performs. There is no conspicuous consumption in freight transport. Further, small quantities of bulk commodities like coal or cement move some time by road, because rail facilities are not available. If the railways are strengthened with rolling stock and infra-structure, such traffic will come back automatically from road transport to rail. Then even without "allocation" of road traffic, if the railways are equipped to haul bulk traffic they will find their hands full, In view of these, I submit that the recommended inter-modal mix and the fuel savings are attractive only on paper. For they are beset with complications. They cannot serve any public interest or welfare. Let me record respectfully my opposition to them.

3. Taxation

(Chapter 4 of the Report)

3.1 Chapter 4 on Taxation Pricing and Subsidy rejects the findings and conclusions of several earlier Committees.** The Report relies primarily on the findings of a Working Group constituted by the National Transport Policy Committee. The report concludes that "the present tax structure has no adverse effect on (the) road transport industry" (para 4.4 2).

3.2 The principle outlined in paragraph 4.1.2 viz. that "in trying to impose higher taxation for a particular transport service, Government should ensure that services which, by and large, serve lower income or socially vulnerable groups of population who have no other means of transport, are not affected adversely", has not informed the conclusions and recommendations in this chapter.

3.3 Three propositions outlined by the Report merit examination from the above perspective.

i) It is generally assumed that taxation in transport has three distinct functions (a) as a user price in lieu of service provided (b) as part of general revenue collection, and (c) as a shadow price for a scarce resource used in transport sector.

ii) The road users cannot claim any service in return for the taxes they pay up.

iii) There are no data or analysis to reach the conclusion that the tax incidence on road transport is heavy.

3.4 Arising from the classification, the report points out that traditionally Goverment have looked upon transport taxes "as part of general taxation, particularly excise duties and sales tax on petroleum products come under commodity taxation for mobilisation of general revenue, not as a quid pro quo payment for highway Service" "(para 4.1.1). To the report, whether road users pay more or less through taxation than highway expenditure is only of "academic interest". But, may I submit it is not so to the road users. The taxes under whatever category they are placed make appreciable difference to the cost and pricing of the road service. It is alleged that a tradition has always existed to treat transport taxation, specially excise duties and sales tax on petroleum products for mobilisation of general revenues. Even admitting without accepting that such a tradition does exist (I confess I have never seen eference to such a tradittion in any Public Document), should it continue to dominate our thinking irrespective of its correctness or usefulness? Ours is not an unwritten Constitution made up of traditions and usages like that of Britain.

3.5 The proposition that a tax is a compulsory payment to the State without any element of quid pro quo applies to individuals, specially with respect to direct taxes. In the instant case, how can we ignore that a road is a community asset, serving a community, not just an individiual. The road system is an indispensable element of the economic, political and social infra-structure of the State. It serves not only motorised vehicles, but also animal drawn vehicles, hand carts, pedestrians and property owners. It fulfils also political, defence, administrative and welfare objectives be-

**The Committee whose findings and conclusions have been rejected are Motor Vehicle Taxation (Dalal) Committee, 1950-51. Study Group on Motor Vehicles Taxation (Mathur) 1963-65, Eastern Region Transport Survey (World) Bank & Planning Commission), Road Transport Taxation Enquiry (Keskar) Committee, Road Transport Reorganisation (Masani) Committee and the Indirect Taxation Enquiry (Jha) Committee.

sides sustaining catalysing and stimulating the growth of the economy. Anyone who legitimately voices the need for a better, more comprehensive road system, gives expression to a community need. As mentioned in the Report those who ask for much higher scale of expenditure on the road system rightly "attach priority to the adequacy, proper upkeep and optimum utilisation of the road system" (para 10.12.1).

3.6 The shortfalls in attaining targets of the Bombay Plan in respect of National highways (to the extent of 43%) and State highways (to the extent of 20%) was due to financial constraints. So also numerous other shortcomings in our road system impede optimisation of the output of the present road system (paras 10.1.5 and 10.1.7). Even development of rural roads pose a challenge, the major constraint in meeting which is mentioned as finance. With the background of these deficiencies in terms of quantity and quality one cannot reconcile himself to traditional concepts, or even so-called "basic principles of public finance". Obviously these principles cannot be geared to fulfil the obligation of furnishing adequate finance for such a prime community need as even the Rural Roads system, despite disproportionately large contributions to the Public exchequer by the road users.

3.7 It is not that the road users demand an exact quid pro quo. But they do feel that a policy which results in persistent underfeeding of finance for such an abundant revenue-fertile source as roads merits review. Public expenditure on roads must display at least a reasonable correlation to tax revenues from road transport. As a matter of fact the Report endeavours to prove that, indeed, such a nexus exists by stating that public expenditure on roads have "close relationship" with user taxes. But it includes in user taxes only motor vehicles tax and fees and excludes expressly under the guise of "commodity taxes" there from excise duties and sales taxes on fuel (table 4.2. chapter 4.). This specific exclusion of fuel taxes from the user category which indisputably increases the cost of road transport is most intriguing. The fuel crisis is only a recent development. On the other hand, the heavy taxation on fuel side by side continuous under feeding of roads has a history extending over decades.

3.8 It is not suggested that road transport should make no contribution to the general revenues or to the national pool of investible resources. Road transport should be made to contribute to these to the same extent as any other mode of transport. Even a reasonably higher contribution would not be objectionable provided it does not detract from the amount which legitimately should have been spent on development and maintenance of roads in a reasonable condition. The complaint is that such a large proportion of taxes collected from roads are today directed to general revenues that roads are in a state of neglect and as the report states "... the upkeep of existing national assets is of prime importance" (para 10.3.3). The neglect of maintenance results in enhancing fuel consumption and wear and tear of vehicles besides contributing to accidents (para 10.8.1). This practice results in attrition of a community asset, in places wearing down the road to the level of the sub-grade to which we were eye witnesses in the course of our tours. It is this trend of starving finance for roads, in the context of soaring needs that calls for corrective action, As never before two aspects of this policy compel attention. First the better the road, the lower is the consumption of petroleum fuel. So in spending more rupees on roads the country will halt substantial foreign exchange outgo. Larger allocations to roads is a measure of fuel conservation. Second, roads and road transport constitute a buoyant source of tax revenues. They deserve promotional policies. But I accept that they should be consistent with the compulsions of the present fuel crisis.

3.9 To the extent commodity taxation mops up consumers' surplus it will not exercise any adverse impact. As the common man in our country has a low level of living, there is no economic or social justification to subject his use of mass transport facilities to commodity taxation purely for revenue purposes, as in commodities and services like cosmetics, five star hotel services etc. I would therefore, like to record my dissent from the view that transport tax levied in any form is entirely a revenue measure. It is in this light that the excise and sales taxes on fuel have to be viewed not on pure revenue considerations.

3 10 Let me pay my tribute to the Report for identifying the single most important reform in road taxation as the need for uniformity, rationalisation and simplification of taxes so that there is maximum economy and efficiency in collection

(para 4.1.4). This will also minimise unproductive formalities which result in so much harassment to the operators.

3.11 The report concludes that no evidence is there to show that the tax burden on road transport has "inhibited its growth" or that it is causing "loss" to the operators Taxation is an item of cost Merely because an industry continues to bear a particular level of tax burden, there is no justification to conclude, as does the report (para 4.4.2 and 11.4.3) that the profitability, on the basis of data supplied by tax authorities, is around 30% and at times even 70%. Evidently the tax authorities cannot take into account numerous cash payments made under the table by the operators, inter alia on the highways. This would result in showing profits at a somewhat higher level than the actuals in their tax assessments. In this connection I would refer to tab'e 11.2 in chapter 11, of the report. It brings out that the number of trucks per one lakh population declined from 64.7 in 1971-72 to 58.1 in 1977-78. Similarly in relation to 100 kms of surfaced roads it declined from 85.7 in 1971-72 to 67.4 in 1977-78. Even the bus population per 100 kms of surfaced roads had declined from 23.4 in 1971-72 to 21.5 in 1977-78. The apparent increase in the motor vehicle population between 1950-51 and 1977-78, i.e. from 3 06 to 32 36 lakhs indicating growth of about 1060 per cent is due to the phenomenal growth of two and three wheelers. These have increased during this period by about 5590 per cent as against about 530 per cent growth of cars, jeeps and taxis, 345 per cent of buses, 450 per cent of trucks. This shows that the growth of four-wheelers has lagged behind increase in population as well as surfaced road lengths. Besides the share of roads in total freight traffic has declined in terms of tonne-kms from 34 per cent in 1970-71 down to 32 per cent in 1977-78 (table 11.3, chapter 11). These can be taken as evidence of uncertain, if not low, profitability and inhibited growth of commercial transport.

3.12 Further it cannot be doubted that heavy taxation whether on capital cost or operation cost of road transport must increase the fares and freights and thus inhibit the normal and natural growth of road transport It is argued that the transport operator does not bear the burden himself but shifts to the users and as such he has no grounds for complaint. This cannot stand scrutiny. Eventually and in the long run every indirect tax is shifted to the consumer. In this context, the fact that the masses use road transport for personal transportation and wage goods are carried in goods vehicles should be borne in mind. Precisely therefore, the authorities must be wary of imposing heavy tax burden on road tranport as it will bring down disposable incomes in the hands of the poor and stoke the flames of inflation. Although in absolute terms one cannot say whether tax burden is heavy or not, objective yardsticks could have been evolved such as tax burden per 1000 tonne kms of traffic moved by road as well as rail which would have facilitated meaningful conclusions. Similarly comparisons could have been made between different modes of transport with respect to the contribution made by each one to the general exchequer and/or to the total pool of investible resources of the community. This report does not endeavour such a comparison. Yet it does not hesitate to state that the tax burden on road transport is not heavy. If it is discriminatory apart from being inequitable it will still have an inhibitory effect on the growth of road transport.

3.13 It cannot be gaid-said that the road transport passenger and goods operations serve basic needs of millions of people. Nor can it be denied that the cost of transportation affects the prices of all products, particularly items of mass consumption like vegetables, textiles and food grains, where cost of transport bears heavily on the price at which it is made available to the consumer. Does a policy of heavy and discriminatory taxation on road transport serve the interests of "lower income or socially vulnerable groups of population"?

3.14 Annexure 4.1, chapter 4 in, Section IV highlights the need for charging an interest/dividend of Rs 200 crores from road transport sector for the community's investment of about Rs. 2000 crores. This works out to 10%. In para 4.1.8 it is pointed that the rail system contributed 40% of the total rail development plan outlay from its internal resources. Presumably 60% of the rail investment come from the general exchequer, on which the Railways paid no more than 5.50% to 6.50% —this at a time when the opportunity cost of capital has been ranging between 12 to 15%

or even higher.

3.15 I warmly welcome the suggestion made in para 11.6.15 and 11 14 3 that national and zonal permits should be issued without any limit. But I doubt very much if it will have the salutary effect, it should have, if full taxes are to be charged in every State. The present pattern of multi-point taxation results from India having a Federal Constitution. If India had a unitary Constitution. this question of multiple taxation would not have arisen at all. In any case a vehicle operating in State 'A' at a given point of time cannot use the roads of State 'B' or any other State for which it may have opted and taxed for. Thus there is no equitable justification for taxing a national permit holder for all States he opts to operate for the whole period at the full rates. Besides in any case inter-State traffic is generally operated on National highways on which the State governments do not spend a single paisa. The suggestion, if accepted, will be the easiest method of frustrating the achievement of the 20-Point programme

3.16 As regards octroi the Report has rightly suggested that it should be phased out in stages. But it has anticipated the Centre to persuade the State by even extending financial assistance. No time-bound programme however has been suggested. It would have been better if the report had recommended its complete abolition. Whether in small towns or big cities-Bombay, Calcutta-within a reasonable time.

3.17 The report has advocated the use of fuel taxation not only for raising revenue but also for ensuring socially efficient use of this scarce resource (para 4.1.5). I would like to add in the present circumstances nothing is of as great importance to the country's transport as R & D on alternative fuels to P.O.L. and a sizeable portion of tax revenues should be devoted to that and for extensive geological surveys with a view to discover new and productive oil fields.

4. Freight Equalisation

(Chapter 5 of the Report)

4.1 According to the report the effect of eight equalisation is two-fold. "Where it is erated for intermediate products such as Iron and eel the intention is to disperse industrial activities. By contrast where it is applied to finished or semifinished goods like cement the effect is to bring industry closer to raw material sources" (para 5.3.1). I shall deal with the cement industry about which I happen to know a little. But my remarks may apply equally well to other industries similarly situated as cement.

4 2 I feel that in any case the location of an industry like cement, using a low priced bulky raw material like lime stone, has to be sited on or adjacent to a lime stone deposit, where other essential bulk inputs such as coal, as also power, can be made available without undue difficulty and high cost. It is but natural that the richest deposits will be exploited first in preference to the poorer ones, particularly if freights are pooled. This leads to regional imbalances.

4.3 Gradually, of course, as demand increases even relatively poorer deposits which may be closer to the markets, will have to be exploited. In the result regional implances will gradually be reduced

4.4 This is what is happening to the cement industry today. Only a few States and Union Territories are now deficit in cement capacity, principally Punjab, Haryana, Delhi, Maharashtra, West Bengal and the North Eastern Region, and have to continue to draw their supplies from factories which are at some distance from them. Here again during the next 10 years, quite a few cement plants have been programmed to be installed in Rajasthan and Madhya Pradesh, which even currently are surplus States. As these factories go into production, these two States will throw up progressively larger surpluses which will cater more abundantly to the demand in deficit areas mentioned above, entailing shorter leads and lower transport costs in the operation of the freight pool.

4 5 The report on the other hand has made a general recommendation that freight equalisation on all commodities be phased out as it leads to non-optimal location of industries. In view of what I have suggested in the preceding paras abcut the cement freight pool, I feel that it would not be worthwhile in the interest of any party concerned—the consumer. the producer or the transporter to disturb and upset the established conditions under freight equalisation, which have

obtained in the cement industry over a period of more than the last 50 years or so. The shortage of cement which prevails today cannot be ascribed to freight equalisation. It is due rather to the production capacity being short vis-a-vis the total demand in the country. Freight equalisation on the other hand helps cement to reach the remotest corners which may not be possible without it.

4.6 In any case before it is intended to discontinue freight equalisation on cement, I recommend that a thorough examination of the issues involved at that time be made from the point of the consumer, the Government, the industry and the transporter with particular reference to supply to the deficit States, and the transport facilities and transport costs to them.

5. Road Transport

(Chapter 11 of the Report)

5.1 In para 11.6.7 the report notes that the prescribed fee for private carrier permits is marginally lower than for the public carriers. The report is unable to see any justification for charging a lower fee for private carriers. May I submit that a proper appreciation of the role of a private carrier viz. that the vehicle carries goods belonging only to its owner - an individual or a business— does not justify such a recommendation. Basically there is practically no need for the requirement that a private carrier should be covered by a permit. It is comparable to a passenger car for which no permit is required. The fee charged for private carriers are lower because they do not operate for hire or monetary reward, carry goods only of the owner and therefore, usually cover less distance, and thus make less use of the road system than a public carrier does. In view of this it will be realised that there is no justification for (1) the requirement that a private carrier should be covered by a permit and (2) the view that the fees charged for a private carrier should be the same as that of a public carrier.

5.2 In para 11.9.13 it is rightly noted that in the process of taking over new routes by State Transport Undertakings, least inconvenience should be caused to the public. However, the report goes on to suggest a time limit of one year during which if a transport undertaking is unable to operate a service already notified the notification should automatically lapse, so that the travelling public does not suffer. I feel that as the State Undertakings have gained considerable experience in taking over and operating existing or new routes, the time limit of one year is too long. In the first place no notification should be issued until detailed surveys have been made of the route, and the number of vehicles to be pressed into service in the context of the number of existing operators as well as the vehicles already operating on such routes has been decided upon. Once these preliminaries have been completed an undertaking need not take anything more than three months at most six months for implementing the takeover programme, without any hardship to the travelling public, I would like to suggest that the end of six months at most from the date of notification, it should automatically lapse, unless the undertaking provides requisite services.

5.3 In para 11.10.2 the report rightly stresses the need for an all-round effort inclusive of improvement and proper maintenance of the road system and reduction in the number of octroi check posts as these lead to wastage of time and fuel. I wholly endorse the recommendation of the committee but would like to add that no check post at all, the activity of which can be substituted by alternative means can have any reason for continued existence. The thrust of our policy in this respect should be to substitute octroi duties by an alternative levy and as a result secure elimination of all octroi check posts not just a reduction in their number. Further to the extent that they hold up vehicles, other check posts too should be eliminated consolidated and/or minimised. Besides wherever possible the check posts should be located along side the wayside amenities for the operators, so that the essential minimum checking function coincides with the rest period of the operators. This will enable higher levels of utilisation, besides securing high standards of fuel efficiency by eliminating fuel wastage.

5.4 In para 10.11.4 the report rightly emphasises recourse to productivity techniques such as tractor-semi-trailer combinations in view of the very pressing need for fuel conservation. While the report suggests that this may be encouraged it has attached a rider that we should keep in view "the carrying capacity of the road system". The net effect is that a good idea is watered down and poor roads will

continue to be a limiting factor, imposing avoidable wastage of scarce fuel. In the context of the fuel crisis and the heavy imports bill, the country has everything to gain by upgrading at least the major arterial roads to accommodate tractor/semi-trailer combinations keeping in view their productivity and fuel efficiency. I do not elaborate on the need for adequate allocations for roads and the type of development and maintenance programmes to be undertaken as the report mentions the same in paras 10.3.3, 10.3.6, 10.6.2, 10.6 3, 10.6.3 and 10.8.4.

5.5 Currently a good number of drivers, not only are accident prone but also waste fuel, drive rashly, display no courtesy for other road users and behave as if they are a law unto themselves. The report (para 11.13.4)stresses rightly the importance of proper education and training of drivers of heavy vehicles to reduce the number and severity of accidents. The report (Table 11.8, chapter 11) shows that an increasing and the largest percentage of accident in the country are caused by "fault of human element". It is not improbable that in some cases pedestrians may also be at fault; in most cases however the over bearing and aggressive behaviour of heavy vehicle drivers would seem to be the cause of the accidents. The intention of such heavy vehicle drivers would be to put fear in the minds of other road users because he has a powerful instrument of destruction at his command in the shape of a truck or a bus and, therefore, right or wrong, he must be given precedence on the road else The present driving schools, being commerical institutions suffer from inadequate equipment, poor teaching methods and do not have teachers with requisite experience and knowledge. Syllabi need to be revised broad-based and standardised. The candidates must be required to undergo suitable psychological tests too. The driving licence may be refused to candidate, who may be technically competent, if psychologically accident-prone. Driving schools also must come under greater control, preferably, of technical education department. Through broad-based training, strict assessment before issue of driving licence and periodical evaluations at the time of licence renewal, we must build up high safety standards and driving excellence in the country. In the present fuel crisis, the driver's skill in fuel conservation would also have to be, assiduously cultivated.

6. Urban Transport

(Chapter 12 of the Report)

6.1 In para 12.2.5 and Annexure 12.II. India's ratio of urban population to total population is compared with that in other countries. Although our ratio of urbanisation is lower, we can take little consolation therefrom—firstly because such a large proportion of our urbanisation is focussed on large metropolitan cities already bursting with humanity. Secondly, because we are not equipped with resources, natural or financial, to cope even with the present low rate of urbanization. The evidence lies in the extremely squalid level at which life is lived by the majority of our city dewellers. I append in this connection a quotation from the report of the Barve Study Group for Bombay submitted in 1959 - Annex.III.

6,2 Although more than two decades have passed, there is no improvement in the position recorded by the late Mr. Barve - rather a steady deterioration. If we cannot take care of 110 million urban population (at 1971 census), what prospect is there of our being able to do any better with 278 million at 29.4 per cent of the then population by the turn of the century, which the report does not consider "really alarming"? We have to accept the fact that in view of the generally low per capita GNP which refuses to increase in the face of our low level of total production and exploding population, we have not been able to make any sizable impact on the quality of life of the majority of our population, whether urban or rural. The point is that we just cannot afford the massive investments that necessarily have to be made to provide and maintain living standards even at the lowest levels demanded by big city conditions. On the other hand, in any small town or village even without large investments, life can be lived at a reasonable level and services and amenities such as water, housing, roads, electricity, education, medical care etc. can be provided with lower per capita outlays. We should evolve therefore a national urbanization policy which discourages drastically—and not in words alone but in terms of actual implementation even under some pressure—the drift to large cities, and provide countermagnets in the shape of well planned smaller towns with avenues to livelihood and with appropriate amenities to counter the "city light" (para 12.5.11). The small towns would then attract the would-be

migrants to themeslves. In the absence of such a policy the prospect of 278 million urban population really frightens me. For it means that instead of a majority of 110 million living in sordid squalor today, the majority of 278 million will be living such a life.

6.3 In para 12.5.4 referring to dispersal of "population and economic activities within a metropolitan area" the report states that whereas the congestion would decrease in central areas, the total transportation requriements are likely to increase. This certainly would be the result if the dispersal comes in the shape of dormitory suburbs as at present. What we need is not a proliferation of such suburbs but that of self-sufficient well planned satellite towns and new towns provided with reasonable amenities, where proper linkagesare built between places of work and residence. This would definitely reduce the demand for urban transport. Today's suffering commuters would then be able even to bicycle or walk to and from their work. At the same time there is no reason why life in such towns should be dull and dreary if appropriate facilities are provided.

6.4 In para 12.5.7 the report poses two views; one against the growth of large cities, the other in their favour. which alone, according to protagonists of the latter, can solve the problems of rural poverty, as urban centres have a potential for creating wealth which can be invested in towns as well as the countryside to alleviate their poverty. The fact,however, remains that the cities in India have hardly been able to solve the problem of higher investment within their own areas. as witnessed by the proliferation and the explosive growth of slums in all large cities. How can it be suggested then that they will spread prosperity in the surrounding countryside?

6.5 Para 12.5 of the report points out that even in Soviet Union, efforts to restrict growth of major cities did not meet with success because "powerful forces attract capital and labour to established centres which are likely to grow even if national policy seeks to prevent it". Surely this should not imply that no attempt should be made in this direction. The lesson to be drawn is, thanks to the efforts made by the authorities to restrict the growth of the major cities, that the population stands where it is. Otherwise it would probably have attained double or treble the present figure. Although results cannot be achieved overnight, every effort should continue to be made to make the restrictions effective. so as not only to check the growth of their population but even to reduce it. For what is the alternative? In the absence of a national urbanization policy focussed on limiting the population to a reasonable figure related to the resources such a city can command our metropolitan cities would bloat to a population of say 20 or 30 million. The population of Bombay for example at its present rate of growth, is calculated to reach 19.1 million by the end of the century. What sources of water and power to mention only two necessities of city life-are then proposed to be tapped? Are we prepared for the growth of such megalopolises? If not, we need urgently a national policy on urbanization focussing on the growth of small self-contained satellite towns and new towns and depopulation of our over-grown metropolises.

6.6 Para 12.5.11 states that the creation of productive job opportunities to 230 million additional people in rural areas would not be an "easily attainable target". My reaction to this is, nor would it be so even in urban areas? The answer is not in permitttng the present city population to be swollen by uncontrolled and unregulated migration. Firstly, we should restrict India's total population growth by strictest birth control measures-not only persuassive but, even coercive-which would result eventually in reduction of the country's population. Some inducement given by the Chinese are generous incentives to non-children families in the shape of larger salaries, better housing, preferential employment opportunities; or in the case of one child families, easy admissions to best schools and colleges. Secondly, we should restrict the growth of population in the big cities. In fact the Sixth Plan(1978-83) itself prescribes "the highest priority will be accorded to restricting the growth of population in the larger urban conglomerates. In addition, States and Central Governments will be requested to put a ban on the setting up of offices, commercial establishments and centres of entertainment and culture in these cities. Various fiscal and other measures will be considered for depressing the demand of telephones and transport facilities in pursuance of this policy. Unless fairly drastic measures of this kind are taken, there is a growing risk that in course of time civic

services will begin to break down and the quality of life will deteriorate further". Even the Fourth Plan had favoured "not only pieventing further growth of population, but also de-congestion or dispersal of population."

6.7. As stated in para 12.5.14, transport has indeed a limited role to play in restricting or reversing the population growth in metropolitan cities. Nor would denial of adequate intra urban transport achieve this goal. However, there can be little doubt that the frightening growth of population in large cities is at the root of their transport problem as also of most other civic problems. Restriction or reversal of the trend of population would contribute substantially towards easing the perpetual transport crisis our metropolitan—even smaller—cities are facing today. It is in view of this conviction, that I have taken the liberty to deal extensively with the population problem of the cities. And it is not the transport problem alone which is the off-shoot of excessive population in the city areas. Their population is the *primary problem* and most of the hardships and shortages faced by the city dweller can be traced thereto.

6.8 Coming to the solution of the transport problem in Calcutta the underground railway (UGR) is already under construction. The economics of this underground line if worked out (which I doubt very much) has not adequately been publicized—except that 17 km will cost about Rs. 250 crores of which Rs. 45 crores have already been spent. Assuming the line does carry 13.2 lakh passengers per day in 1986 and 17.2 lakh in 1990 as anticipated, the question may be asked what are the fares proposed to be charged to enable it to serve the bulk of the city's population as a mass transit system. Will the average Calcutta commuter who reacts so vehemently, even violently, against the increase of tram car fares by a few paise, be able to afford and be willing to pay the much higher underground fares fixed on an economic basis ? If not, which authority would subsidise the UGR—the Railway Board, the Central Government, the State Government or the Calcutta Municipal administration ? Assuming Rs. 250 crores estimated cost is an accurate one, how is this enormous expenditure going to add to the quality of life of the average Calcutta citizen ? How many well-planned satellite towns and new towns with linkages between their places of work and residence could have been built around calcutta within an outlay of Rs. 250 crores? Would not the money spent on UGR have given much more meaningful returns than that of the UGR, if such a scheme for planned towns has been implemented ? Having regard to the fact that Rs. 205 crores i.e. about four times as much money as has already been spent, will still have to be invested on this project, is it worthwhile spending good money after bad? It is just as well that we have not launched such UGR projects in all the four metropolitan cities, as originally contemplated. There is nothing against building surface railways for intra-city mass transit for Calcutta and for other cities wherever warranted. But the UGR is another kettle of fish altogether. Even in a city rolling in wealth like New York, according to a recent issue of Time Magazine (14th April, 1980) notwithstanding all the inducement to the commuter to resort to UGR in the current P.O.L. crisis, the New York UGR has incurred a loss of Dollar 200 million last Year.

6.9 I have tried to point out above that intra-city transport shortage is only one of the many problems the roots of which are deep in the excessive population, far above what Indian cities planned or unplanned—are capable of accommodation at even a minimum civilised standard of living. The problem is compounded by the continuous flow of migrants into these big cities. The planning authorities are fully conscious of this. The issue, therefore, is how can we stop the flow of migrants into cities which adds continuously to the gravity of their problems. The official policy so far has been focussed on provision of counter magnets such as Vashi for Bombay, Kalyani for Calcutta and Faridabad for Delhi, to which, the would-be migrants to the mother city. it was hoped, would voluntarily be attracted. This, however, has not proved effective. The present policy of the Government, Central and States, therefore, is to allow things to drift. On this basis, our nine big cities, to which many more will be added, hold out the dreaded prospects of unlimited increase in their population to tens of millions within a very few decades, with even further adverse repercussions on the quality of life of the city dweller. Should we allow this to happen ? If it is accepted that big city conurbations are not what we want in India, should we

not adopt some legislative and/or administrative measures, even coercive up to a point, to deflect the would-be migrant to other avenues and areas where he would do himself and the community to which he migrates a lot of good, instead inflicting himself as an additional burden on the big city. For nine of our cities it is already too late. It may soon be too late for ninety!

7. CONCLUSION

7.1 *Inter- Modal Mix* : The approach to inter-modal mix should be based on an awareness not only of oil crisis but also of our socio-economic priorities, and genuine needs of development. Also even under our planned economy freedom of choice of the user cannot completely be disregarded or over-ruled. Any inter-modal mix based on "allocation" of traffic in pursuit of one objective alone fuel savings may not be conducive to our national developmental objectives. I have suggested ways and means of obtaining optimal productivity from the limited fuel available at high cost.

7.2 *Taxation* : Regarding taxation of road transport the data placed before the Committee did not warrant any value judgment, least of all that it was not heavy and that it exercised no adverse impact on the road transport industry. In the absence of objective standards for comparison of tax burden on different modes of transport and the fact of heavy contribution road transport is called upon to make to general revenues, it is difficult to disagree with the view that it is discriminatory against road transport.

7.3 *Freight Equalisation :* I have commented only on freight equalisation on cement with which I happen to be little familiar. With several new factories under construction in Rajasthan and Madhya Pradesh the freight leads are bound to be reduced and the demand on transport eased. In view of this I feel the 50 year old system of freight pooling (which contributes towards price equalisation) and which makes cement available at uniform prices even in far corners of the country, need not be disturbed without in-depth examination.

7.4 *Road Transport :* The recommendations that there should be no freezing of the national and zonal permits comes as a breath of fresh air in the traditional and prevailing attitude of imposing restrications on road transport. However, the proviso that full tax be paid in each state may to a large extent neutralise the effect of liberalisation of inter-state permits. So also will be the effect of "allocation" of traffic recommended by Inter-Modal Mix chapter which will have the effect of confining road transport principally to an intra-regional exchange of goods. Octroi and other check posts which involve substantial wastage of fuel and lead to corrupt practices as well as under utilisation of the road system should be abolished within the given time frame.

7.5 *Urban Transport :* The shortage of transport as of other civic services experienced in the nine large cities is almost entirely the result of the explosive growth of population principally by migration, during the last three decades or so, to which these civic services even periodically augmented, were never meant to cater. The policy of providing counter magnets to attract migrant population to them such as Faridabad to Delhi, Vashi to Bombay, Kalyani to Calcutta has not proved successful and populations of these cities continue to increase uncontrolled. We should therefore provide some administrative or legislative barriers to this uncontrolled flow of migrants into the cities and focus efforts simultaneously on dispersal of population of large cities to well planned satellite towns and new towns which provide both homes as well as avenues of livelihood within reasonable walking or cycling distance of each other. This will reduce total demand for urban transport as also provide better quality of life to our urban population.

F.P. Antia
April 25, 1980.

Big increase in Operation Range of Electric Vehicles Forecast

A significant increase in the operating range of electric vehicles will be possible within the next six years, it was predicted at a conference in London.

Delegates at a two-day briefing on latest develoments in battery technology were told that the sodium sulphur battery looked set to make a serious challenge to the traditional lead acid battery for motive power.

Mr. Geoffre Lomax, applications manager of the Chloride Silent Power Company, said new sodium sulphur batteries likely to be commercially available for 1985 could give a 7.5 tonnes medium goods vehicles a range of 193 kilometres between battery charges This was a considerable improvement on the range of present-day electric vehicles which are mostly limited to 80 kilometres or less.

Five years' concentrated research by Chloride on sodium sulphur cells has shown that such a battery produces three times more power than a lead acid battery of the same size and is only a fifth of the weight. The sodium sulphur battery needs no maintenance or topping up and can thus be located out of sight and reach, under the chassis of the vehicle.

Overnight Recharging

Tests have shown that the new battery will retain an impressive 90 percent efficiency over its operating life. Cells of this type have been tested on a charge-discharge cycle totalling more than 10,000 hours.

One of the early problems was a recharge time which could be as long as 100 hours. This has now been reduced to eight hours, which makes overnight recharging practicable.

Mr. Lomax says work has now started on the design of a battery for a typical medium-weight goods vehicle. It consists of two compartments containing a total of 480 cells which combine to give a working voltage of 180 volts and a stored energy of 140 hours.

Although predicted manufacturing cost of the first generation of sodium sulphur batteries will offer only a slight advantage over lead acid, its low cost materials give promise of more substantial savings in later generations.

Mr. Lomax believes that the new battery could also be suitable for some mining applications and attractive for roles such as submarine propulsion.

Courtsey : Safety News, March 1980

BHEL Develops Battery car

Bharat Heavy Electricals' Bhopal factory has developed a device that can run a battery-operated car up to 60 km in single charging at a maximum speed of 60 km an hour.

Fada News, April 1,1980

The device, a thyristor chopper controller, has been designed to operate on a 96 volt battery and control the speed of DC series motors at 150 to 250 ampere current.

The prototype of the device has been handed over to Delhi's transportation systems groups for fitting on a one-tonne vehicle.

Kick Alcohol Auto & Do Away With Oil

Brasilia : The Brazilian automobile industry begins selling cars powered on almost pure alcohol to the general public on April 8.

The home-grown fuel will reduce Brazil's heavy reliance on imported oil and will be cheaper than regular fuel. The fuel consumption of the alcohol engine is, however, 20 per cent moro : 1

The Government intends to substitute about 20 per cent of its 1.2 million-barrel oil consump-

Annexure I (contd.)

tion with alcohol by 1985. And it is officially estimated that Brazil, a nation of 123 million people with 8 million autos could have almost 2 million alcohol-motor cars on the road by 1983 including older models with converted engines.

For the past year thousands of Government vehicles have been running on alcohol and selective sales were made to taxi drivers and others.

Car manufacturers say they have thousands of orders for the alcohol-powered cars.

Indian Express—April 2.

Annexure II

Energy Crisis and Road Transport

Note I

With the advent of the energy crisis, mainly caused by the hinking up of the crude oil prices and curtailment of production by the OPEC countries, rail interests in the country have begun playing up the energy-intensive nature of road transport. They have used it as an argument for clamping further administrative restrictions, tax burden and regulatory curbs on road transport. A sectional approach to a national problem can hardly yield a meaningful policy recommendation.

Viewing road transport as an integral part of the composite transport structure and viewing transport as a key factor of the infra-structure and for development, I commend a coherent growth-oriented approach in tackling this problem, placing over-all interests of the economy and the people above everything else. Such a perspective can be given concrete expression on the following propositions.

(i) In a situation of high prices and scarcity of oil, utmost economy and optimum results should be secured in the use of petroleum fuel in all sectors including transport.

(ii) Demand for transport is a derived demand and seldom facilitates free substitution among different modes, as there is considerable product-differentiation between the services rendered by different agencies of transport. Clamping restrictions or denial of permits for certain types of road services will not always automatically transfer that freight to alternative modes.

(iii) The shipper should enjoy the freedom to select the mode of transport for his shipments as he alone is aware of the total financial costs.

(iv) Any curb or restriction placed on available road transport services without reference to users' needs or choice as well as dependability or efficiency of alternative modes will only impart a rude jolt to production, public distribution and exports. Over 62% of our export cargo move by road to the ports. India is a market of continental dimensions, wherein textile, tea, sugar, groceries, medicines, fruits and a variety of other consumer and producer goods find their way out into a national pattern of distribution. Even production facillties located in different parts can survive only if there are timely arrivals of raw materials and planned distribution of the finished products in a vast market.

(v) Any energy-saving solution will remain partial if it dries up other inventory or packaging economies or if it sets off new distortions in the economy. A partial solution is no solution.

(vi) Partial solutions and panic are no substitutes to well-thought-out short-term and long

term solutions.

In my considered view, energy, intensiveness comparison of different modes of transport which embody altogether different technologies tailored to fulfil differentiated transport objectives is an unreliable guide for realising overall optimum energy economy. It is, I feel, not correct to compare a diesel locomotive with a truck as a wide gulf separates them. Obviously, compared to a big ship a diesel locomotive is far more energy intensive.

Further to limit the shippers choice to any mode only in relation to its energy intensiveness will result in disregarding the criteria of speed, flexibility, definite schedules, reliability, minimised cargo loss or efficient claims settlement practices that more often than not weigh in directing shippers choice. Thus energy is only one of the factors, although it is an important factor, in rating the suitability and growth pattern of different modes of transport in a developing economy launched on a dynamic phase after centuries of economic stagnation.

I do however concede the over riding significance of oil crisis in calling for a reappraisal of policy and in evolving short term and long-term strategies for furthering growth.

In the short-term the strategy will embody—

(a) Better co-ordination of road and rail through further development of container piggy back and similar services.

(b) Optimum traffic output from existing road transport fleet through.

(i) Maximum maintenance efficiency of vehicles and adherence to prescribed minimum fuel consumption standards.

(ii) A dynamic road development and maintenance policy to facilitate operation of heavier vehicles as well as articulated tractor/trailer combinations to economise in fuel consumption.

(iii) Improved driver training, upgrading of service stations, workshops.

(c) Encouraging by all means to generate higher traffic output and to consume less of fuel, through short run applied research in vehicles.

(d) Increasing use of blends like gasohol.

(e) Improved route scheduling eliminating empty hauls' if any.

(f) Elimination of octroi and other checkposts resulting in saving of fuel from idling vehicles.

In the long term the strategy will embody—

(a) Continued oil exploration, on shore and off shore.

(b) Improved vehicle design, use of lighter materials in the chassis and body of the vehicles.

(c) Improved tyres.

(d) Scientific location of industrial units eliminating cross-hauls.

(e) Research in alternative, renewable indigenous sources of energy.

A mature response embodying such a total strategy will, I submit, enable India to ride through this crisis without deflecting from our goals of economic development, elimination of poverty and liquidation of unemployment.

Annexure II (contd.)

Energy Crisis and Road Transport

Note II

The comparison of energy intensiveness of different modes of transport no doubt facilitates forecast of energy demand in the future. By itself the energy consumption rating cannot form the total basis for directing the course of future transport development.

The demand for transport in general and road transport in particular, is a function of general economic activities. The shippers' choice of specific modes of transport emerges from an interaction between growing economic specialisation and territorial division of labour as also the service characteristics of different modes and overall distribution costs. Considering that transport cost ranges between 20 to 30 percent or less, in the overall picture, energy intensiveness may be one of several factors that influences, decisions in so many instances. Even from the point of view of financial costs, if the shippers evaluate total distribution costs they find road transport superior to rail, despite incomparably heavy tax burden, poor roads, operational hurdles like octroi, sales tax and other checkposts enroute which render road freight rates much higher than they need be. Small is beautiful, economic and efficient.

While energy availability is critical to immediate decisions, in the long run it is a minor element. We have to remain cool and collected and should not lose a sense of proportion.

There are important reasons which render permit curbs, traffic transfers, etc, unrealistic.

(i) Refusal to permit the natural need-based growth of road transport will only create net reduction in mobility, more transport shortages and higher distribution costs.

(ii) Arbitrary, coerced traffic transfers will not alter the service characteristics or overall distribution cost incidence to the user by recourse to unwanted alternative modes like rail, IWT or coastal shipping.

(iii) It will give rise to distortions and cause permanent damage to the commercial vehicles and automobiles ancillaries manufacturing industries throwing out of employment lakhs of persons.

(iv) It will undo the progress achieved in decentralised development and the progress of backward regions in the country.

(v) Further there is less justification for pessimism in regard to the future options in energy. Our consumption of energy per capita is very very low, at 201 kg. coal equivalent, compared to Japan (3839 KG), Canada (9816 KG), Germany (W) (5689 KG), U.K. (5464 KG), USSR (5252 KG), and USA (11,485 KG). So we cannot contemplate curbs in social infra-structure needs like transport without material damage to our economy. In the years to come despite subdued growth rates the economy will have to strive for higher levels of mobility.

In this situation, blends of fuel as well as substitute fuels would play a major role in powering our development. Also where is the need for taking the present internal combustion engine as the last world in automobile technology ? Not only that, motor spirit and alcohol have been successfully blended ; there has been successful mixing of 8 per cent alcohol with HSD in Rajkot. In Japan, they have been successfully used oil taken from the eucalyptus tree which has confirmed existence of energy capacity similar to gasoline and high octane value near to that of gasoline. Even for alcohol, there has been an alternative in ethanol. Ethanol has been commended specially for developing countries. It is obtained from fermentation with yeast from plants containing sugar and starch such as sugarcane, sugar beet, maize, tapioca or cassave rice and other grains. The electric bus is in operation in different countries, despite some handicaps. Hydrogen is being used in experiments as substitute fuel for automotive vehicles. Researches have been carried out at Lockheed as well as General Motors of United States. Hydrogen is cheaper to produce than other synthetic fuels like methane. It burns clearly and is expected to solve the problems of

pollution. Its application for use in aircraft hydrogen would have advantage of 22 per cent of energy utilisation. According to the New York Times, a U.S. firm is already offering a hydrogen car which can switch to gasoline when hydrogen is not available. The car gives 180 Kms. on a tank of hydrogen and the tank half an hour to replenish. The problems that remain to be tackled are the cost of electrolyser that converts water into hydrogen besides the weight and cost of hydrogen storage tanks. But these are not impossible of solution. India also has built a hydrogen-based prototype motor.

We need not over-react to the present difficulties on the oil front because that would land us in truly difficult and costly alternative transportation arrangements. It would also hurt the progress of scientific research and technology in the country.

In the short run or in the long run, we have to attach considerable importance to fuel conservation measures. Straight away by abolishing octroi and other checkposts by improving road surfaces and developing, need based maintenance programmes, encouraging use of truck/tractor trailer combinations, securing reduction in the dead weight of vehicles and through proper vehicle maintenance and improved driver skills, substantial economy in the consumption of motor vehicle fuel are within our reach.

Annexure III

"The absence of playgrounds and recreational space for children as well as the citizen-body; school buildings unworthy of the coming generation; a deficit of housing to the extent of a third of the total population with all that this shortfall means to the lower income groups who have to bear the entire incidence of the deficit; the squalor and disgrace of slums accounting for several lakhs of the population ; large proportions of working people perforce living single and bereft of domestic life with all the inevitable effect of this deprivation on social vice; ceaseless squabbles, litigation and chronic state of "cold war" between tenants and landlords; the degradation and shame of queues and quarrels over water taps and the use of sanitary conveniences; the daily grind to several hundred thousand persons who have to travel $1\frac{1}{2}$ to 2 hours each way in choked trains to and from their work; a myrid scowls and distempers attending upon traffic as it daily snarls up at a hundred places in trying to force its way through a wholly inadequate criculation system; this is the unvarnished picture of living conditions generally in which the 43 lakhs of population in the "Urbs Prima in India" have to subsist. This number represents no less than 10 per cent of the State's entire population. Yet it is really unnecessary that such large numbers of people in the premier city of the country should be consigned to live such squalid, stunted fractious lives. The problem is entirely soluble. If it is tackled with determination, we make bold to say, within a couple of years distinct improvements, ought to be visible and within 5 years the problem would have been set well on the way to a solution. It is no more and no less than a challenge to the civic statesmanship and organisational capacity of the authorities concerned."

COMMENTS ON THE NOTE OF DISSENT

1.1 We, the former members of the National Transport Policy Committee met on the 6th and 7th May 1980 to consider the note of dissent submitted by our colleague Dr. F.P. Antia on the main report. We also had an opportunity of discussing the note of dissent with Dr. Antia.

1.2 We have noted with great regret that the bulk of the note of dissent by Dr. Antia is not based on the recommendations of the Committee. At places, Dr. Antia has attributed some views to the Committee which are not even mentioned in the report. He has drawn wrong conclusions from various tables, annexures and statements in the report of the Committee, without caring to look into the recommendations made therein.

1.3 The main points on which Dr. Antia has recorded his dissent are on :

(a) Optimal Inter-Modal Mix

(b) Taxation

(c) Freight Equalisation

(d) Road Transport

(e) Urban Transport

We shall deal with each of these briefly.

2. Optimal Inter-Modal Mix

2.1 Here Dr. Antia's note suffers from the handicap of his not having properly grasped the suggestions made in the Committee's report. In evolving a National Transport Policy to cover a span of two decades, the inter-modal mix has to take into consideration the comparative resource cost to the economy of various modes of transport including their fuel usage intensities. The Committee in its report has adopted assumption III(a) in table 3.34 and not assumption IV in Annexure 3.9 as understood by Dr. Antia. It is this misunderstanding about the assumption used that has led Dr. Antia to record that the Committee's recommendations would tend to divert a larger share of inter-regional traffic from roads to railways. Assumption III(a), if adopted will alter the share of rail and road in inter-regional traffic in terms of tonne kilometres from the present level of 82:18 to 90:10. In the overall quantum of traffic, both intra-regional and inter-regional combined, the share will tend to shift from the present 67:33 to 72:28. While dealing with the total increase in the volume of traffic anticipated by 2000 A.D., the Committee has projected the following increase in road traffic :

Passenger : 250 billion pkms in 1977-78 to 800 billion pkms

Freight : 77 billion tkms in 1977-78 to 182 billion tkms.

This is quite a substantial growth and the investment required on road transport, both for roads and vehicles, to carry this level of traffic will be stupendous. In Chapters 10 and 11 the Committee has dealt with this adequately.

2.2 Dr. Antia has also mentioned in para 2.4 of his note of dissent that the Committee has not taken into consideration social costs and benefits in arriving at the best inter-modal mix. The Committee in its report at para 3.8.4 has mentioned the difficulties involved in assessing social costs and benefits. However, we presume that the Government and the planners while taking investment decisions will make the best informed judgement of the social costs and benefits between the different modes of transport. It is quite possible that if factors like 'pollution, policing and accidents' as also questions like 'percolation of technical skills' and 'serving administrative, political and defence objectives' are taken into account, railways may have an edge over road transport.

2.3 It has to be recognised that the oil crisis is not just a passing phase, as Dr. Antia tries to make out in his note. Indeed all the available evidence indicates that the crisis is likely to con-

tinue in the foreseeable future. Despite tremendous efforts made to augment domestic production of crude, India's dependence on foreign sources for oil will tend to increase over the years and a stage may come when even at high prices, oil may not be available in sufficient quantities. Transport sector alone accounts for 30 per cent of our total oil consumption and over 65 per cent of our consumption of diesel. The choice of modes which are less oil intensive must receive paramount importance in overall transport plannnig strategy.

2.4 Dr. Antia, on the misconception that assumption IV has been suggested, goes on to show how large chunks of traffic in fruits and vegetables, household goods, etc. which now move by road will be forced to go by rail. This is not correct. First of all, the suggested alternative will only tend to shift eight per cent of inter-regional traffic from road to rail and that too not in respect of each commodity. The 8% shift will be in global terms, that is, in terms of all the commodities taken together. This shift will not be brought about through any administrative control or regulation but through investment and pricing policies. The Committee has not visualised any restriction whatsoever on customer's preference.

2 5 Dr. Antia has laid some stress on employment aspect in the transport sector. True, road transport is more employment intensive than certain other modes ; but the total effect on expansion of employment opportunities through this mode alone would not be significant in the totality of the country's employment generation. It is precisely for this reason that the Committee in its report laid so great an emphasis on the development of a technologically efficient transport system in order that the projected volume of traffic is carried without any bottlenecks which might cripple the growth of the economy and consequently the expansion of employment in the country.

2.6 Dr. Antia in para 2.7 of his note has stressed the advantages road transport has in moving export cargo because of its flexibility and 'start anywhere and go anywhere' features. As mentioned earlier, the likely shift of 8% of inter-regional traffic to rail is in global terms and not in terms of any specific stream. Moreover, it may be mentioned that the report of the Operations Research Group (Baroda) from which Dr. Antia has quoted has also observed that nearly 77% of the export cargo moved by road (in value terms) is upto a distance of 400 kms. It also mentions that in terms of tonnage about 57% and in terms of value 46% of the cargo moves upto a distance of 25 kms only. In any case short distance traffic is expected to move by road transport. For promoting export trade the Committee has suggested an increasing use of containerisation and piggy back system on railways to provide flexibility of 'start anywhere and go anywhere' features.

2.7 Dr. Antia in para 2.15, (e), (f) and (g) has expressed concern about short distance haul of his note less than rake load moving by railways, non-substitutability between road and rail and the suggested inter-modal mix extinguishing the freedom of choice of the shipper. Dr. Antia is aware that railways as per Section 27 of the Railways Act, cannot refuse any consignment offered to them while road hauliers can. As regards non-substitutability this has been taken into consideration and this is precisely the reason why only 50 per cent of the traffic above break even point is considered as shiftable. Here again, this is in global terms. Moreover, in the case of commodities like coal, foodgrain, mineral oil, cement, iron and steel, limestone and dolomite, there is considerable movement of inter-regional traffic by road and the shift to rail can be in respect of these heavy and bulk commodities rather than fruits and vegetables depending on customer's choice. The question of extinguishing the customer preference does not arise at all.

2.8 Dr. Antia in para 2.16 of his note has referred to meddling with investment in roads and road transport. A reference to chapters on roads and road transport will show the emphasis the Committee has given to investment in road and road transport.

2.9 In the light of what has been stated in the preceding paragraphs some of the observations made by Dr. Antia as given below are misleading. In fact, they are contrary to the Committee's recommendations and in total distortion of the Committee's report.

—"increasing dependence on one mode of transport and artificially pegging down the growth of another". (para 2.4).

—"Road transport is sought again by this allocation to be confined, caged and cribbed principally to small areas of size of a district in which it can ply as intra-regional traffic". (para 2.5).

—"To discourage such hauls by road on a discriminatory basis will deal a severe blow to India's export endeavours". (para 2.7).

—"Once the damage of investment famine is done to road transport". [para 2.15 (a)].

—"To the extent road transport is downgraded and restricted, efficient domestic transportation of India's export cargo will be dealt a severe blow". [para 2.15(b)].

—"The suggested inter-modal mix has presumed total substitutability between rail and road in inter-regional transport". [para 2.15(f).]

—"The worst casuality of this scheme of inter-modal mix is the freeedom to the user of the transport" [Para 2.15(g)].

—"However, meddling with investment in roads and road transport to achieve such ends merits unqualified opposition". (para 2.16).

3. **Taxation**

3.1 In para 3.2, of his note Dr. Antia has referred to the question of equity income distributional effect of road taxation, particularly to the transport needs of low income or socially vulnerable groups. Unfortunately, Dr. Antia has not noted the observations of the Committee in para 4 4.15 where it has made a plea for operating public road transport services at subsidized fares for people in backward or hilly areas. Nowhere in the Committee's report an observation has been made as stated by Dr. Antia in para 3.3 sub para (ii) of his note that "the road users cannot claim any service in return for the taxes they pay up".

3.2 In para 3.5, Dr. Antia has made the observation "The proposition that a tax is a compulsory payment to the State without any element of *quid pro quo*, applies to individuals, specially with respect to direct taxes." It may be submitted that this applies equally to all direct and indirect taxation including commodity taxation.

3.3 Dr. Antia has referred to the financial constraints and the inadequacy of funds for the road system which has impeded its operation at optimum level in para 3.6. Again it is not only roads, road transport and other modes which are suffering for want of finances; there is inadequacy of funds for equally, if not even more important objectives like power generation, irrigation, health, education and so on. Government has to balance the conflicting requirements of the various sectors of the national economy.

3 4 We find ourselves unable to support the statement made in para 3.7 by Dr. Antia: "Public expenditure on roads must display at least a reasonable co-relation to tax revenues from road transport". If this principle is extended to tax revenues from other sources, it can cause serious distortions in the national economy. On the other hand, the Committee has stressed the need (in chapter 10 and 11) for providing adequate finance for the maintenance and construction of roads and for development of road transport without any *quid pro quo* as far as taxes raised from this sector are concerned.

3.5 As regards para 3.9 of Dr. Antia's note, in which he has opposed the levy of commodity taxation on road transport purely for revenue puroposes, it may be pointed out that taxes are not levied on the transport sector alone. They are also levied on almost all commodities of mass consumption, either in the form of excise duties or sales tax.

3.6 It appears to us that having failed to find any evidence of the tax burden "inhibiting the growth of road transport" or causing "loss" to the operators, Dr. Antia in para 3.11 has drawn a totally irrelevent and wrong conclusion from table 11.2 of the Committee's report by taking the growth of commercial vehicles only for a part of the period rather than taking it for the thirty-year period as illustrated therein. The variation of the motor vehicle density as indicated in table 11.2 and as explained in para 11.2.2 of the report has been due to the relatively faster growth of road length even to remoter areas than a corresponding growth of commercial transport vehicles.

3.7 Regarding the question of transport cost affecting prices of consumer products mentioned in para 3.13 of Dr Antia's note, the Committee has in paras 4.2.5 and 5.4.3 of its report indicated that the transport costs do not add significantly to the final delivered price to the consumer for items

of mass consumption. Therefore, the tax element in transport cost will be a still lower and an insignificant percentage of the delivered price.

3.8 The only point which we wish to make in regard to para 3.15 of Dr. Antia's note is that motor vehicles tax is not related to the length of the road used by a vehicle in any particular State nor is there any direction, compulsion, rule or regulation that a national or zonal permit holder will ply only on the national highway and will not use the State highways or other roads. Nor are we able to understand how having recommended liberalisation of national and inter-State permits, our proposal "will frustrate the achievement of the 20-point programme".

4. Freight Equalisation

4.1 We have no comments to make on the views expressed by Dr Antia as the main report has already dealt with the subject at length. We, however, wish to draw attention to the following points :

(i) Freight equalisation in cement was not introduced 50 years ago as mentioned by Dr. Antia in paras 4.5 and 7.3 of his note. In fact this was introduced by the Government of India from 1.7. 1956.

(ii) As has been mentioned in paragraph 5.3.2 of our report, the average lead of traffic after equalisation has increased, particularly in the case of cement it has increased from 372 kms in 1960-61 to 676 kms in 1977-78. By contrast, the average lead for coal, which is not subject to freight equalisation, has shown a decline from 664 kms in 1960-61 to 586 kms in 1977-78.

(iii) The Committee has nowhere stated that freight equalisation has caused a shortage of cement which prevails today.

5. Road Transport

5.1 Dr. Antia seems to have only elaborated the various points made in the main report and therefore, no comments are called for. The only difference of opinion relates to the recommendation made in paragraph 11.6.7 of the report where it has been recommended that there should be no differentiation in taxation between private and public carriers.

6. Urban Transport

6.1 Dr. Antia has gone much beyond the terms of reference of this Committee and has expressed his personal views on national population and urbanisation policies which were completely outside the scope of our Committee. However, the Committee has in para 12.3.4 and paras 12.5.12 to 12.5.14 dealt with some important aspects of the urbanisation policy and has touched upon them to the extent these impinge on the urban transport policy. We have also indicated that the subject of urbanisation and land-use planning is a complicated subject needing detailed study. However, we would like to disassociate ourselves completely with the personal views expressed by Dr. Antia on this subject and particularly with his observations, namely 'we should restrict India's total population growth by strictest birth control measures-not only persuasive but, even coercive, which would result eventually in reduction of the country's population' (Para 6.6 of Dr. Antia's note); "should we not adopt some legislative and/or administrative measures even coercive up to a point to deflect the would-be migrant to other avenues and areas" (Para 6.9 of the note); and "we should therefore provide some administrative or legislative barriers to this uncontrolled flow of migrants into the cities" (para 7.5 of the note). All the evidence the Committee had and everyone we met from the Chief Ministers downwards in all the large metropolitan cities, very strongly and in no uncertain terms opposed any kind of coercive, administrative or legislative measures to restrict the freedom of people of this country from moving from rural areas to any city, as such measures would be counter-productive and contrary to the provisions of our Constitution.

6.2 Dr Antia in para 6.8 of his note has referred to the construction of the underground railway in Calcutta. We have not examined or commented upon the economics of the underground system. But the Committee has recommended (and with this Dr. Antia will also probably agree) that the problem of the movement of people in the major urban cities is not one which could be solved by surface road transport alone and therefore rapid mass railway electrified system is a must for this

purpose. We have, accordingly, recommended the examination of a number of such mass rapid transport systems for the major metropolitan cities of the country as also other larger cities in our report in paras 12.7.1 to 12.7.11. If such a system could be designed on the surface, it would be preferred but if surface space is not available, mass transit system will either have to be above ground or underground. This is a matter of techno-economic feasibility and the choice will vary from city to city. Dr. Antia has referred to the New-York underground system. We may, however, note that as many as 16 cities both in developed and developing countries are presently constructing underground mass transit systems for easing their urban transport problems.

7. In the earlier part of the note of dissent, Dr. Antia has stated that the Committee has been overwhelmed by the fuel crisis in making its recommendations. He has himself, however, in para 5 4 of his note recognised the existence of the fuel crisis and the heavy import bill, when it suits to prove his point.

8. We are unable to share his optimism that there will be very shortly a technological break through which will not require the use of petroleum based fuel as tractive power for road transport in the foreseeable future. Moneover, the newspaper clippings which Dr Antia has appended to his note,(which, incidentally have appeared after the submission of our report) could not have formed the basis for any policy recommendations by us.

9. While we concede the right of a member to express his difference of opinion through a note of dissent, we take strong exception to Dr. Antia's suggestion that the Committee has made an attempt to belittle the role of road transport. In this connection, we would like to reproduce our recommendations in regard to roads and road transport as given in para 11.14.1 and para 8 of the conclusion in our report.

"Road transport being geographically the most pervasive and of great significance to surface transport system of the country, we attach importance to its systematic development to enable it to meet the growing demands. The Motor Vehicles Act 1939, whose restrictive character has lost relevance, should be revised so that it becomes an instrument for promoting an efficient, adequate, economic, and safe road transport system." (Para (11.14.1).

"The principal modes of transport will continue to be rail and road. Railways cannot reach every part of the country while roads have the advantage of being more extensive and providing door to door service to users. In an integrated transport system, each mode is complementary to the other. There is likely to be little real competition between modes because of the nature of commodities for movement and the geography involved. As requirements of transport capacity will continue to grow in future. there is a potential for developing all modes of transport according to their comparative resource cost advantage".(Para 8 of the Conclusion).

SUMMARY OF RECOMMENDATIONS

Chapter 1 : Objectives of National Transport Policy

1. Long gestation periods are involved in building up transport capacity. A long term view has, therefore, to be taken and funds allocated for creating transport capacity ahead of demand. (Paras 1.1.5 and 1.5.5).

2. Passenger transport should be given adequate attention to improve travel conditions. (Para 1.2 2).

3. Attention must be given to transport needs of rural areas together with inter-urban and intra-urban passenger travel of an essential character. (Para 1.2.3).

4. When planning new transport facilities it is essential to ensure a realistic appraisal of traffic demand. Efforts should be made to reduce delays in planning and execution of transport projects. (Paras 1.4.1 & 1.4.2).

5. Transport is an essential element of an integrated plan for area development. Inadequacy of transport may at times serve as an inhibiting factor in the development process. (Para 1.5.4).

6. The issues to be considered in evolving an integrated framework for transport policy are determination of the size of total transport investment, distribution of these resources between various transport modes and the fixation of tariffs for transport services. (Para 1.6.1).

7. Transport should be included in the priority sector for determination of interse priorities for the plan. The allocation of funds to the transport sector has perforce to be larger than of those sectors where the incidence of lumpiness of investment is not so heavy. (Para 1.6.2).

8. There has been a progressive decline in the share of transport in the total plan outlay, and if this trend continues, it could damage the nation's economy. There is also need for maximum economic use of all available capacities in the transport system. (Para 1.6.6).

9. Investment policy for an optimal inter-modal mix should be based on comparative resource cost analysis of various transport modes. Transport investment decision should also take into account social costs such as caused by congestion, pollution, accidents and noise. (Paras 1.7.1—1.7.3).

10. Every transport undertaking should at least, cover its short run operating costs. Attempts should be made to avoid subsidies unless there are weighty considerations for their retention on social grounds in which case they should be direct. (Paras 1.8 2 and 1.8.3).

11. Transport agencies should be given freedom to fix their own fares and freight rates on the basis of their costs so long as they do not violate the broad pricing guidelines set by the Government. (Para 1.8.5).

12. Energy conservation should be the overriding consideration in determining an optimal mix of our future transport system. (Para 1.9.1).

13. Impact of environmental objectives on transport should be considered. Sound traffic management and effective land-use policy can help in reducing the adverse effect of environmental pollution and hazards. (Paras 1.10.1 and 1.10.2).

Chapter 2 : Transport Development in India—A Review

1. Railways and roads have been the principal modes of transport. In 1950-78, passenger traffic increased from 66.5 to 177 b. pkms.

and freight traffic from 44 to 163 b. tkms. by rail. On roads, it is estimated that in the same period passenger traffic increased from 23 to 250b. pkms. and freight from 5.5 to 77 b. tkms. (Paras 2.3.3 and 2 3.10).

2. A significant development is the marked shift in the relative share of rail and road transport in the total traffic carried. The share of road transport in both passenger and goods traffic increased at a much faster rate than of railways, although in absolute terms, traffic increased substantially on both the modes. (Para 2.4.1).

3. Despite continuous efforts made since 1951 to augment the capacity of various modes of transport, the transport sector has generally experienced bottlenecks and capacity shortages. The imbalances between the demand and supply of transport facilities has adversely affected the smooth functioning of the economy. (Para 2.5.1)

4. The imbalances underline the need for creating transport capacity ahead of traffic demand, so that some cushion in the system exists to meet unexpected spurts or shifts in transport requirements. (Para 2.5.5).

Chapter 3 : Determination of Optimal Inter-Modal Mix

1. For determining an optimal inter-modal mix the resource cost analysis of the main transport modes should be considered. The policy aim should be to create a transport system which provides service at the least resource cost to society. (Paras 3.1.1 and 3.1.4).

2. The role of employment generation in determining an optimal inter-modal mix is minimal. (Para 3.1.5).

3. **Energy conservation should be given the over-riding consideration in determining inter-modal mix. The energy efficient modes should have a bigger role to play in future. (Para 3.1.9).**

4. Movement of commodities are generally economical by road for shorter distances upto 300-350 kms., beyond this range, cost advantage lies with the railways. (Para 3.2.15).

5. Movement by block loads are more economical than movement in wagon loads by railways. Break-even points of distance over which rail transport becomes economical reduce further with an increase in the price of diesel and with better utilisation of capacity. (Para 3.2.13).

6. Rail passenger resource costs are higher than those of highway transport although if value on time saving, comfort and convenience are made, cost advantage would be in favour of railways for long distance movements. (Para 3.2.20).

7. Total passenger traffic is expected to increase to about 1344 b. pkms. by 2000 A.D. Road transport's share will continue at about 60 per cent and it would be 800 b. pkms. Rail share would be 520 b pkms. Air transport's share at under 2 per cent would be 23.6 b pkms. (Para 3.5.11).

8. At the present price of diesel and its consequential impact in break-even levels and assuming a shift to rail of only 50 per cent of traffic moving by road beyond break-even levels, the share of rail and road in freight traffic changes from 67:33 observed in the last ten years to 72 : 28. The share of railways would increase further with a rise in diesel prices and if the assumed share of shiftable traffic is increased in favour of rail. (Para 3.7.1).

9. Total freight traffic is estimated to increase to 550 b. tonne-kms. by the turn of the century. In the suggested inter-modal mix railways will be expected to carry 468 b. tonne-kms. and road transport 182 b. tonne-kms. in 2000 A.D. (Para 3.7.2).

10. **Rail and road transport would require annually 14.7 m. tonnes of diesel in 2000 A.D. At current prices(dollar 30 per barrel)this will cost about Rs. 2800 crores. The projections for diesel given by the Working Group on Energy Policy for 2000 A.D. are 33 m.**

tonnes at reference level and 23 m tonnes at optimal level forecasts In comparison with these estimates, the savings would amount to over Rs. 3500 crores per annum in relation to the reference level and Rs. 1650 crores in relation to optimal level forecasts. (Para 3.7.5).

11. A major break-through in technology in the foreseeable future to replace petroleum products for traction in the transport sector is not yet visible. The requirement estimated is the minimum which must be met on priority basis. (Para 3.7.6).

12. Government should try to change the intermodal mix in the desired direction, through investment and pricing mechanism rather than through regulation and physical control. (Para 3.7.7).

Chapter 4 : Taxation, Pricing and Subsidy

1. Taxation in transport has three broad functions : as a user price in lieu of service provided, as part of general revenue collection and as a shadow price for scarce resources used. Taxation and pricing policies should maximise generation of internal resources. (Paras 4.1.1 and 4.1.2).

2. Generally, transport services should cover their short-run marginal costs. Large-scale investment in transport projects which are not economically viable on a long-term basis and do not cover the opportunity cost of capital should not generally be undertaken. Surpluses generated by any transport service should accrue to the national pool of investible resources rather than to its own account separately. While there is no need for any general subsidy in transport sector, there is no objection to cross-subsidization to a limited extent. (Para 4.1.3).

3. Fuel taxation should not only serve as a means of raising revenue, but also as a shadow price for ensuring socially efficient use of this scarce resource. (Para 4.1.5).

4. Railway fare and freight structure needs to be revised to bring it in line with costs and to correct anomalies and undesirable subsidies. (Paras 4.1.6 and 4.2 2).

5. The railways have been incurring losses on suburban systems on account of concessional monthly season tickets even after the upward revision of fares made in April, 1979. These fares should be further raised to wipe off the losses to enable the railways to provide better services. (Para 4.2.3).

6. The railways charge lower freight rates than their costs for certain commodities of mass consumption as a part of their social obligation and incur losses. About 50 per cent of these losses are on account of foodgrains. Since the influence of transport costs on their prices is marginal, the economics of "cost-plus" basis of fixing rail freight rates for these commodities may be examined in greater detail by the Rail Tariff Enquiry Committee. (Para 4.2 5).

7. The location of the North Eastern region, now linked with the rest of the country through a longer route, should not put people of that area to a disadvantage. A suitable freight policy needs to be devised for this region. (Para 4.2.6).

8. Indian Airlines should enjoy appropriate freedom and flexibility for suitably revising and adjusting its fare structure to meet costs and generate maximum internal surpluses. (Para 4.3.2).

9. There is hardly any evidence to show that the overall tax-burden on the road transport industry is heavy or inequitous or it has adversely affected the industry. While the contention that total tax raised from any source should be spent on that source is not tenable, taxes paid by road users as a whole bear a close relationship to public expenditure on road construction and maintenance. (Paras 4.4.3 and 4.4 4).

10. There is considerable scope for and urgent need to reduce the multiplicity of road transport taxes, rationalise the rate structure, simplify the methods of assessment and centralise collection for smooth inter-State

road movements. Tax structure should have uniform basic rates between States so that the incidence of taxation, at least between neighbouring States, is comparable. (Paras 4.4.5 to 4.4.7).

11. Passenger and goods taxes need to be integrated with the motor vehicles tax and collected at a flat rate and at a single point (as is already done in some States) rather than vehicle-wise and as a percentage of fare in case of passenger buses. (Para 4.4.8).

12 There is no justification for charging a uniform composite fee of Rs.700 for national and zonal permits. These permits should be issued liberally but full fee applicable to each of the States to which they relate, should be charged at a single point in the home State. (Paras 4.4.9 and 4.4.10).

13. In the interest of smooth inter-State road transport and for reducing wide disparity in taxation as between States, Centre may consider the desirability of introducing a suitable legislation. (Para 4.4.12).

14. There is need for adjusting excise duty on diesel so as to reflect its true cost to the economy. (Para 4.4.13).

15 Fares of public sector road transport undertakings often do not cover short-term marginal costs These should be revised and brought in line with the cost-structure except in certain special cases where, if necessary, a direct exchequer subsidy may be provided. (Paras 4 4 14 and 4.4.15).

16, Octroi should be abolished in stages starting with small localities of say 25,000 population or less. While this is primarily the responsibility of the State Governments, Centre should use its persuasive powers and encourage the States to abolish octroi even by extending financial assistance to them. (Para 4.5.6).

Chapter-5 : Freight Equalisation

1. Freight equalisation is not the only instrument to achieve balanced regional development. Other measures such as licensing policy, appropriate fiscal and credit facilities, provision of essential infra-structure are also equally important. (Para 5.2.4).

2. The beneficial effect in terms of regional dispersal as a result of freight equalisation was more than offset by increase in real transport costs. (Para 5.3.2).

3. Freight equalisation has had little effect on generating employment activity in backward regions. There is a case for phasing out existing freight equalisation scheme. (Para 5.3.3).

4. For commodities of mass consumption freight equalisation will not make a significant difference in the final price paid by the consumer. This can be better achieved through a comprehensive distribution system. (Paras 5.4.3 and 5.5.2).

Chapter-6 : Machinery for Transport Co-ordination

1. The purpose of transport co-ordination is to create technical, economic and other conditions for allocation of traffic among transport modes and to help development of transport facilities in each mode in the required proportion at the least cost to the society. (Para 6.2.1).

2. Procedures for approval of investment projects are different for different transport modes and applicable only to Governmental investment. The criteria for appraising transport projects should be common irrespective of the mode or agency. (Para 6.2.4).

3. There is need for a centralised pricing authority to recommend common criteria for fixing fares and freight rates for different transport modes. The constitution of a National Transport Commission with persons having wide and varied experience is proposed. The three main functions of co-ordination—pricing, investment and regulation could be entrusted to this Commission. (Paras 6.2.7 and 6.3.7).

4. The National Transport Commission could

study traffic flows and demand to frame an appropriate inter-modal transport mix and examine fiscal and taxation policy, monitor functioning of the transport system, identify imbalances in the availability of services and advise Central and State Governments in the matter of transport policy. (Para 6 3.6).

5. Similar arrangements are recommended for co-ordinating transport policies and programmes at the State and local levels, within the overall policies prescribed by the Central Government. (Para 6.3.14).

Chapter-7 : Transport Planning and Data Base

1. Transport Planning requires development of a systematic methodology for projecting traffic demand and its allocation on the basis of resource costs of different modes of transport. Continuous research will be required on these aspects in order to improve the reliability of traffic forecasts. National Transport Commission should encourage research on methodology of transport planning and appraisal. (Paras 7.2.1—7.2.7).

2. Methodology and the framework evolved by RITES for computation of resource costs and compilation of traffic flows are in right direction. Information on traffic flows and resource costs should be periodically collected, preferably once in every five years. (Paras 7.3.2—7.3.5).

3. Transport Projects generally involve large-scale investments and generate considerable amount of secondary and non-user benefits. There are also complex problems of quantification of social costs such as pollution, environmental effects, accidents costs, etc. and other intangibles. These costs and benefits cannot be properly assessed by applying financial feasibility criteria. Their assessment requires a broader frame of social-cost benefit analysis. Transport projects in future should be appraised within such a wider framework The present appraisal methodology adopted by the Project Appraisal Division of the Planning Commission is satisfactory for road investment projects but needs to be strengthened for projects in rail, port and other sectors of transport which involve large-scale investments. (Paras 7.4.1 to 7.4.10).

Chapter 8 : Transport Research and Training

1. An inter-disciplinary centre should be set up to stimulate research, conduct studies and impart training in transport planning and management. It should enjoy autonomy on the lines of the Institutes of Management and Institutes of Technology. (Paras 8.2.1 and 8 2.2).

2. Efforts should be made to encourage research and training at the universities and other specialised institutions. Necessary financial support should be provided. (Para 8.2.3).

3. A wing or a unit should be organised as part of the National Transport Commission to function as a central forum for co-ordinating the research and development efforts undertaken by different institutions for various modes of transport. This wing should be appropriately advised by a group of experts. (Para 8.2.5).

Chapter-9 : Railways

1. Growth of both passenger and freight traffic on the railways has been steady, utilisation of assets has improved, density of traffic per route km has increased over the years. There is need to augment both rolling stock and line capacity to meet the projected demand of traffic and avoid bottlenecks in the system. (Paras 9.2.1—9.4.1).

2. The growth of passenger traffic has been faster than what was provided for in the successive five year plans. It is necessary to plan for a realistic growth to meet the requirements of growing population and of new centres of economic activity. (Para 9.5.3).

3. Railways should not expand their services for short distance passenger traffic except between pairs of points where the dentisy of traffic is very high. For short distance

traffic, feasibility of introducing more buses in certain States needs to be explored. (Paras 9 8.1 and 9.8.3).

4. Railways should increase loading in train loads and running of point to point trains to ease pressure on marshalling yards and to improve wagon turnround (Para 9.11.3).

5. Railways have lately not been able to meet the demand of traffic. Freight traffic on railways is likely to grow to over 460 b. tkms by 2000 A.D. Capacity has to be augmented for handling this traffic. There should be enough resilience in the system to provide for spurts of traffic and changes in pattern of movement. (Para 9.14.1).

6. Vigorous steps will be necessary to increase capacity on important trunk routes. It may be necessary to plan alternative routes especially for coal movement to relieve congestion on existing routes. This could help also in reducing the distance between pairs of points and consequently the transport effort. (Para 9.16.2).

7. Rationalisation of terminals, mechanisation of loading and unloading of bulk goods, running heavier trains from siding to siding, clubbing of 'smalls', creation of dumps for coal, steel, cement and other commodities needs to be undertaken. (Para 9.16.3).

8. Coal traffic is likely to grow substantially. It will be necessary to review coal loading arrangements and pilot working, remodel coal yards and development of new ones to enable operation of unit trains. (Para 9.17.2).

9. Reilways should reduce the differentiel in speeds bdtween freight trains and mail/express trains to improve line capacity. (Para 9.19.1).

10. Railways should develop containerised traffic and introduce piggy back system. This would also speed np the movement from oue gauge to another. (Paras 9.20.1 and 9.20.2).

11. With the completion of the microwave net work, railways should now go in for computerised wagon control and yassenger reservations. (Para 9.21.1).

12. Scparate parcel terminals should be planned particularly at metropolitan cities. Parcel trains could also clear 'smalls' traffic. (Para 9.22.1).

13. Priority should be giben to dieselisation of important sections on metre gauge. Also rolling stock and track structnre need to be improved to move heavier trains at faster speeds on metro gauge. (Paras 9.24.3 and 9.24.4).

14. Fast express trains should be tinroduced between pairs of points on metre gauge. (Para 9.24.5).

15. Although technolgical inputs would improve operation of metre gauge sectionsr it is necessary to gradually convert to broad gauge high density freight routes which involve heavy transhipment. Major ports should be connected by the broad gauge system. Para 9.24.6).

16. While taking up metre gauge conversion schemes it should be ensured that the through link in the all-India nelwork of metre gauge is not disrupted. (Para 9.24.8).

17. All narrow gauge sections except the central India narrew gauge system and some narrow gauge hill sections should be closed down. A system approach should be adopted where their conversion to either metre gauge or broad gauge may form part of a network and is justified on traffic potential. (Para 9.25.2),

18. Formation and other permanent assets of these narrow gauge sections should be handed over free to State Governments. However, before closing, it should be ensured that adequate add efficient road transport is available to serve those areas. (Para 9.25.3).

19. Programme of electrification on railways

has been slow. An electrification programme of at least 350 kms. per year to cover the main trunk routes is necessary. (Para 9.27.7).

20. 5750 kms. of new rail lines have been constructed since 1950. Most of the new lines have served the purpose for which they were conceived. (Para 9.28.2).

21. Investment criteria for new lines should take into account the financial return and benefits to the economy. A wider social cost-benefit criteria for appraisal needs to be applied. Construction of new lines should be taken up to fulfil the following objectives:

    a) as project-oriented lines to serve new industries or tap mineral and other resources;

    b) to serve as missing links which can form alternative routes to relieve congestion on existing busy rail routes;

    c) on strategic considerations; and

    d) as developmental lines to establish new growth centres or give access to remote areas (Para 9.31.1)

22. Any region where natural resources are available an integrated plan should be evolved to develop new growth centres and promote economic activity, the provision of a new rail line being an element in such developmental plans. (Para 9.31.1)

23. Reducing total transport effort and relieving congestion on the existing saturated network are important criteria for construction of new lines. There is urgent need for developing alternative routes on which traffic can be diverted, reducing leads and consequently total transporation effort. (Para 9.31.2).

24. Where existing routes are heavily congested, even after doubling tracks, building an altogether new route between the main nodal points will give the system a better viability than addition of a third track. This will enable alternative routes to operate during dislocations caused by natural calamities. (Para 9.31.4).

25. During the next two decades, the railway network will need to be expanded by at least 5,000 kms. (Para 9.32.1).

26. Adequate investment on the railways must be ensured to enable them to fulfil the assigned task. (Para 9.33.2).

Chapter-10 : Road Development

1. Since Bombay Plan of road development (1961-81) is about to end, there is need for formulation of another perspective plan for the next 20 years. The new plan should be comprehensive and should take into account road requirements in rural, hilly and tribal areas in different regions of the country, traffic needs and national priorities. (Para 10.1.7).

2. The existing functional classification of roads as national and State highways, districts roads and village roads, is satisfactory and we do not suggest any change except that minimum standards should be prescribed for 'project' and 'urban' roads which presently are not covered by the standard classification. (Paras 10.2.1 and 10.1.7).

3. Roads should be built keeping in view the traffic requirements for 10 to 15 years instead of the present practice of planning on the basis of five years. There is also the need to prepare suitable road and bridge inventories for all categories of State roads particularly the state highways and major district roads, and to update them at regular intervals. (Para 10.2.3).

4. National highways which constitute about 6 per cent of total surfaced road-length in the country and carry over 25 per cent of road traffic, are inadequate in route length and load carrying capacity. Inadequacy of certain selected stretches needs to be urgently remedied. (Para 10.3.2 to 10.3.4).

5. Apart from the existing criteria, substantial reduction in travel time and distance may also be included for declaring State roads as national highways On this basis, 37 missing links and direct connections comprising a length of about 13,000 kms. have been identified for possible addition to the national highway grid. (Paras 10.3.5 and 10.3.6).

6. Around 30 per cent villages in the country had an all-weather road connection on 31 March 1978 while another 16 per cent had fair-weather roads. The estimated requirement of funds to connect all villages with all-weather roads at 1978 prices, is around Rs. 11,000 crores which may not be easy to find. The low-cost alternatives considered by us include integrating the rural roads programme with the Integrated Rural Development Programme, tapping supplementary sources of finance, planning for all-weather road communication through provision of cross-drainages, culverts on kutcha roads, and taking up of works according to district-wise master plans. (Paras 10.4.1 to 10.4.6).

7. For State highways, district roads and other categories of roads, it is essential that master-plans are drawn up in accordance with a long-term perspective and works executed in a phased manner, avoiding delays in completion of works. Traffic surveys and forecasts must be conducted for determining inter-se priority of road schemes under master plans. (Para 10.5 1).

8. Adequate land area should be earmarked in the master plans for urban areas and a system should be devised whereby unnecessary digging up of roads is minimised and repair-work expeditiously completed. (Para 10.6.1).

9. Maintenance of roads in coal-field areas and feeder roads must receive special attention of the State Governments. Rates of road cess may be suitably enhanced to generate resources for the purpose. The entire proceeds of coal cess should be utilised for proper upkeep of these roads. (Para 10.6.3).

10 Union and State Governments should acquire appropriate legal authority for prevention of ribbon development and encroachments on highways. These provisions should be strictly enforced. (Paras 10.7.1 and 10.7.2).

11. Maintenance of roads leaves much to be desired. This is mainly due to inadequate financial provisions. We recommend that road maintenance should receive the highest priority in preference to new construction. Necessary financial provision should be made in accordance with the prescribed norms which should be updated periodically to take into account rising costs of labour and material. (Para 10.8 4).

12. Utilisation of the Central Road Fund should be limited to programmes of road research and intelligence, training of engineers, traffic surveys and provision of way-side amenities. Para (10.10.1).

13. There is urgent need for augmenting research and development effort for road development. Mobile field laboratories should be strengthened and attention paid to reduction in road construction costs through use of locally available materials. Regional soil testing centres should be set up in the country under the aegis of the Central Road Research Institute. Private agencies may be associated with road research and transport engineering work. (Para 10.11.1).

Chapter-11 : Road Transport

1. In 1977-78, mechanished road transport handled 77 b. tkm and 250 b. pkm of goods and passenger traffic respectively. This is expected to go up to 185 b. tkm and 800 b. pkm by 2000-01 A.D. (Para 11.1.1).

2. There is no reliable evidence to show that a single truck operator is not a viable unit. Reorganisation of the structure of the trucking industry is not called for. (Paras 11.4.2 and 11.4.3).

3. The Motor Vehicles Act needs to be replaced

by a coherent legislation for promoting adequate, efficient, safe and economic road transport (Para 11.5.3).

4. The Act provides for a minimum strength of three members including the Chairman for State and Regional Transport Authorities but maximum strength is not prescribed. This should be fixed at not more than seven and should include non-official members with professional backgrounds. Public sector road transport undertakings could be relied upon to determine the need for transport services in an area or on a route operated by them and reference to transport authorities is not necessary. (Paras 11.6.2 to 11.6.4).

5. As the Inter-State Transport Commission was not empowered to discharge the functions for which it was created, it should be discontinued. (Para 11.6.6).

6. Fees charged for private carriers should be the same as for public carriers. (Para 11.6.7).

7. The permit system for intra-State goods transport should be abolished wherever it exists. (Para 11.6.8).

8. In the interest of smooth inter-State freight traffic, there should be no restriction on the issue of national, zonal and other inter-State permits but full taxes for all concerned States should be realised at one point in the home State. (Paras 11.6.14 to 11.6.16).

9. For intra-State passenger services, the procedure for grant and renewal of permits should be simplified so that it does not take more than 3 to 4 weeks for an applicant to secure a permit. (Para 11.6.9).

10. For inter-State passenger services, public sector undertakings should be authorised to enter into reciprocal agreements on behalf of the State Governments and the procedures in this regard should also be simplified. (Para 11.6.17).

11. The system of issue of temporary permits for goods and passenger transport needs to to be rationalised. The Act should provide for a distinction between a temporary permit purely for short-term requirements, and the one needed for a route or an area which has traffic potential. (Para 11.6.20).

12. Apart from improvement in the terms of bank finance such as reduction in margin money stipulation and the repayment period, quantum of bank finance to road transport industry should be increased so that its dependance on private financiers is minimised. (Para 11.7.2 to 11.7.6).

13. Public sector road transport undertakings should be allowed to raise fares to economic levels. When they are required to operate services on losing routes and charge low fares as a social obligation, they must be compensated by a direct exchequer subsidy. (Paras 11.7.9 and 11.7.10).

14. Truck terminals should be constructed by State Governments. (Para 11.7.11).

15. Licensing of goods booking agencies should be expedited. (Para 11.8.4).

16. Passenger bus fares should fully cover marginal costs. (Para 11.8.6).

17. Nationalisation of goods transport is not called for. (Para 11.9.3).

18. Although the performance of public sector road transport undertakings has been by and large satisfactory, there is still scope for improvement. (Para 11.9.11).

19. Before any further nationalisation is undertaken, the existing services should be improved and consolidated. A limit of one year should be prescribed during which if a State transport undertaking is not able to run a service already notified, the notification should automatically lapse so that the travelling public does not suffer. (Para 11.9. 12).

20. For effecting fuel economy in road transport, improvement and proper maintenance of

roads, reduction in the number of check posts, improvements in vehicle design, proper vehicle operation and maintenance are called for. (Para 11.10.2 to 11.10.5).

21. Recycled engine oil should be exempted from excise duty. (Para 11.10.6).

22. There is need to encourage the development of non-mechanised intermediate public transport modes. (Para 11.10.7).

23. It would not be opportune to dieselise taxis in view of the pressure on diesel. (Para 11. 10.10).

24. The bullock cart has assumed added significance in view of severe energy constraint. Research and development to improve cart design should be intensified. (Paras 11.12.3 and 11.12.4).

25. Pedestrain and cycle traffic should receive greater attention in road traffic planning. Intensification of road safety drive, driver education and strict enforcement of traffic regulations are called for. (Paras 11.13.3 to 11.13.6).

26. Traffic Engineering cells should be set up in public works departments of every State. Road surveys should be conducted regularly to identify accident-prone sections for remedial action. (Para 11.13.8).

Chapter.12 : Urban Transport

1. Urbanisation in inextricably with the process of our economic growth. A certain minimum growth of urban population is, therefore, unavoidable. Proper planning is required to develop new urban centres, with employment opportunities, housing and other civic amenities so that people do not migrate to the existing urban conglomerations and cause deterioration in the quality of urban life. (Para 12.3.4).

2. While urbanisation rate in India has been quite modest, concentration of population in a few selected cities is a matter of concern, (Para 12.3.5).

3. Transport policy has only a limited role to play in determining population growth in metropolitan cities. Restrictions on intra-urban transport facilities cannot limit or reverse population growth in these cities. (Para 12.5.14).

4. In the foreseeable future bus transport will continue to be the principal means of intra-city movements. Priority should therefore be given to strengthen and optimise bus services. (Para 12.6.7).

5. Every effort should be made to divert traffic from personalised modes of motor transport to the public transport system. Electric traction based public transport systems should be preferred. (Para 12.6.8).

6. Comprehensive traffic studies have shown that traffic in metropolitan cities cannot be handled by road-based transport system. (Para 12.7.1).

7. In the metropolitan cities the volume of traffic is growing daily and existing public transport facilities are under severe strain. Over-crowding is becoming unbearable and even maintaining the existing transport faci lities is posing graet difficulties. Augmenting the existing suburan rail facilities and providing new electrified intra-urban rail services are essential to meet the traffic demand.(Para 12.7.2 to 12.7.11).

8. The substantial growth of intermediate public transport (IPT) indicates the inadequacy of public transport facilities in small and medium size cities. This will continue to be important as a supplement to public transport. More attention should be paid to it. (Para 12.7.18).

9. Electric trams and trolley buses have an important role to play mainly on considerations of energy conservation. (Paras 12.7.19 and 12.7.20).

10. A suitable organisation should be established at the Centre preferably as part of the National Transport Commission to supervise and monitor the traffic-cum-land-use studies for various cities. (Para 12.7.21).

11. For medium and small size cities bus services are essential. Proper traffic cells should be set up in the States for conducting traffic surveys on a regular basis. (Para 12. 8.8).

12. Improved traffic management methods and control should be given priority. The basic approach needs to be changed and priority given to movement of pedestrains, cyclists and public bus transport system. (Paras 12. 9.1, 12.9.2, 12.9.9 and 12.9.14).

13. A single transport authority should be set up as part of the regional development authority in the metropolitan cities for overall charge of all modes of transport including metropolitan rapid rail transit systems. At operational level these regional authorities could appoint separate boards for separate modes or activities. (Para 12.11.4).

Chapter-13 : Air Transport

1. Air transport offers substantial savings in time over long distances and plays an important role in areas where surface transport is not adequate due to the terrain. In respect of the latter, a separate air line has been recommended for the north eastern region. Special consideration has also to be given to the provision of air services along the west coast, in the Saurashtra region and to kavaratti (Lakshadweep). (Paras 13.5.4 & 13.5.7).

2. Private operators could be allowed to run short haul services to such places as are not served by Indian Airlines, provided infra-structural facilities could be made available with small investments. In case a private operator runs a service on any route at the instance and direction of the Government, subsidy should be provided to him on the same manner as for Indian Airlines. (13.5.7).

3 There is a big gap between seating capacities and operating costs of turbo-prop and jet aircraft presently used by Indian Airlines. There is need to consider acquisition of a more efficient aircraft of suitable capacity. (Para 13.6.3).

4 Indian Airlines should be given more freedom in formulation of its fare structure. Fare revision proposals could be examined by the proposed National Transport Commission. (Para 13.7.2).

5 Tariffs charged by Indian Airlines are not cost orientated, Long haul services subsidise short haul services. The telescoping of fares between long and short hauls is not sharp on Indian Airlines compared to airlines elsewhere. Indian Airlines should rationalise its fare structure to make it cost oriented. (Para 13.7.3).

6. Infra-structure facilities have not kept pace with development of air transport. Capacity for handling both passenger and cargo particularly at international airports should be augmented. (Paras 13.10.2 & 13.10.3).

7. IAAI should devise a tariff structure which should not only pay for investments already made but also finance expansion programme on a long term basis. (Para 13.10.4.2).

8. Civil Aviation Department should carry out cost benefit analysis by taking into account the likely investment required for improvement of infra-structural facilities and the increase in revenues through landing and navigational charges. (Para 13.10.5.1)

9. Air transport infra-structural facilities are subsidised by the general exchequer if servicing of capital, depreciation and development expenditure are taken into account. This is not appropriate. Airport charges should be so fixed as to fully pay for investments made for services to airlines and air passengers. Department of Civil Aviation should maintain its accounts on commercial principles. (Para 13.10.5.2).

10 Civil Aviation Development Fund need not be continued. The development programme of Indian Airlines should be financed by internal generation of resources and any further assistance required should come from general revenues as in the case of other modes of transport. (Para 13.11.1).

Chapter-14 : Coastal Shipping

1. Coastal traffic has declined and is now insignificant. Number of vessels and GRT have remained static. (Paras 14.1.1 to 14.1.3).

2. With steep increase in operating costs and port delays, this mode has lost its competitiveness to rail and road transport. (Para 14.2.4).

3. Freight rates prescribed by Government for coal and salt are below operator costs. (Para 14.2.10).

4. Shipping costs for traffic originating and terminating at ports, without involving any transhipment for overland movement, are lower than rail and road costs. (Para 14.3.3).

5. Future of coastal shipping lies mainly in catering to project oriented traffic, involving close-circuit, 'merry-go-round' movement, like transport of coal to power plants or clinker to cements plants. (Para 14.5.2 and 14.6.2).

6. With an improvement in capacity utilisation of vessels and decrease in port stay and removal of various constraints, coastal shipping could move more tonnage as there is larger quantum of cargo offerings. (Paras 14.2.10 and 14.3.4).

7. For future growth of coastal shipping, the measures suggested are : (i) co-ordination of coastal operations, (ii) modernisation of coastal fleet, (iii) freedom of operations, (iv) simplification of custom procedures, (v) improvement in port facilities, (vi) priority berthing for coastal vessels, (vii) simplification and rationalisation of the procedures adopted for revision and fixation of freight rates and (viii) improvement in operation of coal dump at Calcutta/Haldia. (Paras 14.4.1 to 14.4.14 and Para 14.9.1).

8. Since coastal shipping can relieve pressure on surface transport, this mode will continue as an essential adjunct to surface transport. However, as their operating costs are high, this mode will have to be subsidised. (Para 14.9.2).

9. It is necessary for Government to allot an assured quantity of traffic to coastal trade on long-term basis. (Para 14.5.1).

10 Sailing vessels have declined in number so has the traffic carried by them. But because they conserve energy, financial incentives should be given to operators. (Para 14.7.1)

11. There is a special need for providing adequate steamer services between the mainland and Andaman - Nicobar and Lakshadweep groups of islands. (Para 14.8.2).

Chapter-15 : Inland Water Transport

1. Inland water transport although functionally important in regions in which it offers natural advantage is now almost extinct in the country. (Para 15.2.7).

2. Being location specific, it has only a limited role to play in the transport system of the country. (Para 15.3.1).

3. Most waterways suffer from navigational hazards and lack navigational aids and terminal facilities. (Para 15.3.3).

4. Inter-modal cost comparison shows that IWT has cost advantage for direct movement of cargo only from one terminal to another on the water-front and if it does not involve transhipment to another mode. (Para 15.4.9).

5. Despite the present deficiencies, because of its energy saving aspects and relief to surface transport, this mode can play a useful role in some parts of the country. Therefore, some waterways should be declared as national waterways. (Paras 15.1.1, 15.5.8 and 15.5.28).

6. A proper conservancy policy needs to be followed. (Para 15.5.11).

7. A statutory authority named Inland Waterways Authority of India (IWAI) should be set up for properly developing IWT. (Para 15.5.18).

8. IWT will need considerable Government support. (Para 15.5.28).

Chapter - 16 : Ports and Harbours

1. Congestion at ports adversely affects the competitiveness of country's exports and the growth of its national output. (Para 16.1.3).

2. Planning for port capacity expansion must be undertaken long before congestion actually builds up at ports (Para 16.6.3).

3. Since demand for port capacity is by and large location specific, port planning should be related to the traffic projected at each port. (Para 16.7.1).

4. In view of non-interchangeability of berths, capacity of port must be assessed separately in relation to three broad categories of cargo, namely, (a) wet or liquid bulk, (b) dry or solid bulk and (c) break bulk. (Para 16.7.3).

5. A norm of 75 per cent berth occupancy may be adopted for planning of port capacity. (Para 16.7.4).

6. While the estimates of port capacity and traffic for 1982-83 show surplus capacity for handling wet bulk and dry bulk cargo, the capacity for handling general or break-bulk cargo is likely to be short of demand at most major ports particularly at Bombay. (Para-16.7.6).

7. None of our ports has proper container handling facilities. As a result, it has not been possible to get full benefits of containerisation. For this, specialised facilities should be provided. Complementary rail and road facilities should be created. (Paras 16.8.6 and 16.8.8).

8. The long-term solution to Bombay port's congestion will be by significant additions to its capacity. Such capacity expansion is not feasible in the existing port. There is an urgent need for the development of a deep draft port in the country which can receive modern ships, particularly those carrying container and bulk Cargo. Nheva Sheva is the only site technically suitable for the development of a deep-draft port. (Paras 16.9.5 and 16.9.6).

9. As a short-term relief measure, the Bomay Port Trust should on priority basis explore the economic feasibility of mid-stream discharge. (Para 16.9.8).

10. A special Working Group should be set up to examine the availability of handling equipment at major ports and suggest remedial measures. (Para 16.10.2).

11. The inadequate rail and road transport links have adversely affected traffic handling capacity at some major ports. These ports should be provided with adequate broad gauge rail and road facilities. (Para 16.10.4).

12. Labour should be involved in all schemes of port modernisation. (Para 16.10.7).

13. Port charges must be fixed to cover fully the operational cost at each port. (Para 16.11.12).

14. Port trusts should be given greater freedom in the management of ports to improve their efficiency. (Para 16.12.4).

15. A Central Port Authority should be set up and entrusted with the responsibility of overall planning of port development in the country. (Para 16.12.5).

16. Intermediate and minor ports can play an important role in meeting the requirements of coastal and sailing vessels and to help in reducing pressure on the major ports. (Para 16.13.6).

Chapter - 17 : Ropeways and Pipelines

1. An efficient transport service in hilly terrain is essential for accelerating development.

In this context, construction of ropeways, particularly in steep, rocky and rugged areas, has to be examined. (Para 17.2.1).

2. Ropeways have a distinct advantage in hilly areas and can be functionally useful in selected plain areas as well. This mode of transport can be gainfully utilised for short distances or small stretches for close circuit movement of bulk materials such as cement, coal, clay, limestone and clinker. (Para 17. 2.26).

3. The capital cost of pipelines is high, but their low cost of operation makes it financially viable, given an adequate volume of traffic. The consumption of energy by pipelines is lowest as compared to other modes. (Para 17.3.7).

APPENDIX

1.1 Government of India Resolution on the Constitution of the NTPC.

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No. T&C/3 (15)/77

Government of India

PLANNING COMMISSION

New Delhi, the 26th April, 1978

RESOLUTION

In view of the socio-economic changes that have taken place in the country during the last decade and the new priorities and objectives set out in the Draft 1978-83 Plan, the Planning Commission have decided to set up a high-level Committee to formulate a national transport policy tailored to meeting the new Plan priorities. The policy as approved by Government will serve as the basis for developing a transportation system for meeting the transport requirements of the Community ; as also of agriculture, industry and trade at the minimum social cost. The Committee will be termed the National Transport Policy Committee. Its composition and terms of reference are as set out below :

COMPOSITION

Chairman

1. Shri B. D. Pande

Members

2. Air Chief Marshal Shri P.C. Lal
3. Shri G.P. Warrier
4. Dr. F. P. Antia
5. Dr. M. Q. Dalvi

Member-Secretary

6. Adviser (Transport) Planning Commission

The Committee may co-opt upto a maximum of three experts in any connected field of transport.

TERMS OF REFERENCE

1. To propose a comprehensive national transport policy for the country for the next decade or so keeping in view the objectives and priorities set out in the Five Year Plan. In formulating such a policy, the Committee will :

(a) recommend an optimal inter-modal mix of different systems and also suggest appropriate technical choices within each system keeping in view the need to generate maximum employment potential ; and

(b) suggest organisational, administrative, fiscal and legal measures required for planning, implementing, monitoring and evaluating programmes formulated for giving effect to relevant components of the national transport policy by the Central and State Governments and major transport agencies at both the National, State and local levels.

2. To identify the areas in which the data base of the transport system should be strengthened in order to be able to formulate integrated transport plans and to suggest procedures and methodologies for formulating and appraising such plans at the Central, State, District and Block levels.

3. The recommend areas in which research and development in the transport field should be undertaken and the institutional framework for carrying it out.

4. To suggest measures for improving training facilities in transport planning and management.

5. To recommend any other measures which the Committee consider relevant in relation to the items 1 to 4 above.

The Committee may get studies on various aspects and sub-sectors of the transport system carried out by expert bodies.

The Headquarters of the Committee will be at New Delhi. The Committee may visit such places as may be considered necessary for its work.

The Committee will submit an interim report by October, 1978 and a final report by March, 1979.

ORDER

Ordered that a copy of the Resolution may be communicated to all concerned and that it may be published in the Gazette of India for general information.

K.K. SRIVASTAVA,
Joint Secretary to the
Government of India.

Appendix 1.2

(To be published in the Gazette of India, Part I Section I)

No. T&C/3(15)/77
Government of India
Planning Commission
New Delhi, the 5th July 1978

Corrigendum to the Resolution No. T&C/3(15)/77 Dated 26th April 1978

Against S. No. 6 under the heading 'Composition' in para 1 to the Resolution, substitute for the existing entries, the following :—

6. Shri S.P. Bagla, Joint Secretary, Planning Commission ... Member - Secretary

S/D

(Y. Mohan)

Director of Administration

To

The Manager,
Government of India Press,
Faridabad. (Haryana)

Copy to :—

1. All Ministries
2. All States/UT's.

Planning Commission

National Transport Policy Committee

Questionnaire

A. General

1. What in your view should be the broad objectives of a national transport policy ?

2. How far has the existing transport policy served the objectives of promoting economic development of the country?

3. To what extent can transport policy bring about desirable location and land use patterns ?

4. How can national transport policy be used to slow down the growth of the larger urban centres and encourage the growth of rural areas and smaller towns ? What incentives or disincentives for the transport system could be proposed for this purpose ?

5. Have you any suggestions to make about the methodology of determining the quantum of investment in the transport sector ?

6. What suggestions do you have regarding the principles to be followed for resource allocations to be made to different modes in the transport sector ?

7. Have you any evidence or studies to indicate the labour intensity of the different forms of transport, especially road transport ?

8. Have you any suggestions to make on the pricing, fiscal and taxation policy to enable the objectives of the transport policy to be achieved ? How has the existing framework served the purpose of co-ordinating transport policy ?

9. Should a section, similar to the Section 27* of the Indian Railway Act of 1890 be extended to road transport also ? Alternatively, is there any case for amending it and. if so, in what manner, of Section 27 of the Indian Railways Act for use of the Railways themselves ?

10. What machinery would you suggest for co-ordinating and putting into effect the various elements of the national transport policy at Central, State and local levels ?

11. What are the main areas in the transport sector where there are data gaps ? What measures do you suggest to fill the data gaps ? What institutional arrangement do you envisage to meet this requirement at the Centre and State levels ?

12. What areas would you recommend in which research and development in the transport field should be undertaken and the institutional framework for the same ?

13. What measures would you suggest for improving training facilities in the field of transport planning and management ?

14. What institutional arrangements would you suggest for monitoring and evaluation of transport projects and programmes ?

B. Railways

1. What criteria in your view should be adopted for the construction of new railway lines ?

2. Should the State Governments be asked to make financial contributions for the construction of new railway lines ?

3. How far do construction of new railway lines promote the development of backward areas ? Has the construction of the new

* Duty of railway administrations to arrange for receiving and forwarding traffic without unreasonable delay and without partiality.

lines created a developmental impact in backward areas ? If so, please provide some specific statistical evidence ? If such evidence is not available then please substantiate it with empirical evidence.

4. What should be the policy regarding unremunerative railway lines ? Should these lines be closed down, specially in areas where the traffic for the railways is not sufficient and services of other modes of transport are available ?

5. Is the present rate of electrification on railways satisfactory ? Should the railways accelerate the pace of electrification to conserve the use of oils ?

6. While it is accepted that Indian railways will have to continue with a multigauge system for a long time, please indicate the areas in your view where gauge conversion is necessary.

7. Are you satisfied with the provision of rail transport service for inter-city passengers ? Have you any suggestions to improve the quality of service ? Please indicate your views about the adequacy of terminal facilities for passengers ?

8. How have the creation of dumps for steel and coal worked ? What suggestions do you have for extending the scheme to other commodities ? Who should be responsible for the organisation and running of dumps ?

9. What arrangements exist for dealing with container traffic on the railways—both domestic and international ? How is the future growth planned to be met ?

10. What suggestions do you have for the reduction/rationalisation of freight terminals on the Indian railways ? Are the existing facilities adequate ?

11. As a public utility service, the railways are called upon to carry social burdens including suburban and non-suburban passenger services at subsidised fares. To what extent is it justified to have these burdens on the railways ?

C. **Roads**

1. What in your view should be the criteria for the development of roads ?

2. What is the level of accessibility of roads you consider most appropriate for our villages in order to link them with the national economy ? What measures would you suggest for accelerating the pace of construction of the rural roads ? What should be the minimum specification for construction of village roads ?

3. Please identify the areas where rural roads programme is least developed in your state, and what are the reasons thereof ?

4. Would you recommend a separate agency in the State Governments for the construction and maintenance of rural roads ? If so, what should be its set-up ?

5. What criteria would you suggest for selecting roads for converting into national highways ?

6. What criteria would you suggest for :

   (a) constructing new roads ; and

   (b) undertaking major improvements on existing roads ?

7. What measures should be undertaken for ensuring better maintenance of the road system including rural roads ?

D. **Road Transport**

1. What are the constraints that operate against the operating performance of :

   (a) State Passenger Road Transport Undertakings ; and

   (b) Trucking firms.

2. What measures would you recommend for improving the quality of road transport in the following :

(a) the ease and convenience of obtaining road permits ;

(b) the prevention of unhealthy competition within the road transport industry ;

(c) the improvement of inter-State movement of commercial vehicles ;

(d) the provision of institutional finance for truck operators ; and

(e) the size, quality, capacity and design of commercial vehicles.

3. What do you think of cooperatives and corporations of road operators as a form of improving organisational efficiency ? What has been your experience on nationalisation of passenger transport ? What are your views on nationalisation of freight transport ?

4. Will in your view bullock carts continue to play an important role in the transport system of the country ? What measures are you taking or would you recommend for improving the quality of bullock carts ?

5, What arrangements exist for handling containers by road transport—both domestic and international ? How is the future growth planned to be met ?

6. Are road users as a class paying more or less than they should for the provision and maintenance of the road system ? Please substantiate your answer with statistical evidence.

7. On what principles are fares and freight fixed for road transport in your State ? What is the machinery for its implementation ?

8. What alternative sources of taxation would you suggest for replacing octroi ?

9. Would you recommend imposition of tolls on road vehicles as a means of financing road projects ?

10. What suggestions do you have for amendments, if any, in the Motor Vehicles Act for improving the regulation of road transport ?

11. Do you have any suggestions or comments on the functioning of the Inter-State Transport Commission ? Is the number of national permits and the procedure adopted for its issue satisfactory ?

12, Do you suggest any change in the current practice of subscribing to the capital of the State Transport Undertakings by the Central Government through the Ministy of Railways ?

E. Coastal Shipping and Inland Water Transport

1. What difficulties and handicaps have discouraged the growth of coastal shipping and inland water transport in the country ? What measures would you suggest to promote the growth of these modes of transport?

2. Would you suggest any specific items of traffic that should be diverted on economic considerations to coastal shipping or inland water transport ? Could you also please identify any specific routes along which movement by these modes would be cheapest?

3. Would you indicate any special port facilities that need to be developed for coastal shipping or inland water transport ?

4. What measures would you suggest to encourage the manufacture of coastal and inland vessels and river craft in the country in adequate numbers ?

5. What fiscal or other measures, e.g., port charges, would you recommend to encourage coastal shipping and inland water transport ? How would such concessions be socially or economically justified ?

6. What measures would you suggest for rationalising the structure of and the machinery for the fixation of freight rates for coastal shipping ?

7. Is there any machinery for fixing fares and freight for inland water transport in your State ?

8. What role do country crafts play in carrying passengers and freight on coastal shipping and inland water transport ? What data have you got on movement of passengers and freight on coastal shipping and inland water transport (both country crafts and mechanized vessels) ? What measures should be adopted for improving the quality of data on inland water transport ?

F. Ports and Harbours

1. Are the port facilities (for both major and minor ports) in your state adequate ? What deficiencies, if any, do you notice which need to be overcome to expand the capacities of our ports ? What measures do you propose to remove the deficiencies ?

2. Has there been any significant change in the quantum and/or pattern of traffic handled by particular port in recent years that make it necessary to review the prospects of those ports for future development ?

3. Is in your view the turn-round time taken by ships at our ports satisfactory ? What measures would you suggest to reduce the turn-round time further ?

4. What arrangements exist to handle container traffic at our ports ? What steps would you suggest to improve the capacity to handle containers, roll on roll of and lash ships ?

5. What measures would you suggest to improve and rationalise the system of port charges ? In particular, is there any method by which ports can generate their own internal savings for financing their capacity expansion programmes ?

G. International Shipping and Shipyards

1. What measures would you suggest to increase the share of Indian Shipping in India's overseas trade ?

2. Is it advisable for India to increase the size of shipping tonnage in the present day conditions of shipping market ?

3. What measure would you recommend to ease the liquidity position of Indian shipping companies ?

4. Is the present organisational structure of Indian shipping satisfactory ? What measures would you suggest to rationalise this structure in order to improve the operating efficiency of the companies ?

H. Air Transport

1. What measures would you recommend to improve the operations of the Indian Airlines ?

2. What in your view is the minimum length of haul below which domestic air transport services would be uneconomical to introduce ? Under what conditions should short-haul inter-city services be introduced in the country ?

3. What difficulties and problems do you experience in dealing with the services provided by Indian Airlines ? What are your suggestions to improve passenger amenities on the ground and in flight ?

4. Are the infra-structure facilities required both for domestic and international air transport adequate in the country ? Have you any suggestions to make ?

5. What are your views on the fare-structure of the Indian Airlines ?

6. While one should require the users of air transport to bear the full cost thereof, including the creation of infra-structure like aerodromes or safety measures, are there any criteria which would justify or require departure from this and, if so, would you identify areas for this purpose ? Please also indicate to what extent such services should be subsidized and who should bear the cost of subsidies ?

I. Urban Transport

1. Is the size of the population the basic cause of the poor quality of transport service in

large cities ? How in your view land use planning can help in improving the quality of our urban transport ?

2. What measures would you suggest to provide better transport facilities in our cities and towns ?

3. Is it advisable for the Government to select highly capital-intensive transport projects, such as the underground railways, for meeting the transport needs of the urban community ? Who should provide funds for financing these projects ? How can such projects be financed ?

4. Is there any less capital-demanding option available for public transport in urban areas like trolley buses and trams ? Can you suggest cities in your State where this can be used and, if so, have any attempts been made to assess the cost involved ?

5. What are the arrangements for transport in medium size urban areas ? Are they adequate ? If not, what measures do you suggest for improving them ?

6. How do you assess the role played by taxies; rickshaws and other such labour-intensive means of urban transport in providing essential services to the urban community ? What improvements, organisational as well as technological, would you recommend in order to improve the level of service provided by these modes ?

7. What principles are being adopted for the fare-structure of the urban passenger transport undertakings ?

7. Would you recommend subsidy for urban transport ? If so, specify the conditions under which such subsidy would be socially justifiable ?

9. Would you recommend a single passenger transport authority for urban transport covering the rail, road and water transport services ? Please state the underlying rationale for your answer and if your reply is in affirmative, indicate the organisational form this authority should take ?

10. To what extent have any measures like parking control, staggering of working hours etc. been taken to ease traffic congestion in metropolitan cities ? What measures do you propose to optimize the utilisation of the transport system in urban areas ?

11. Would you recommend participation by local governments, including the State Governments, in the financing of urban transport projects ?

J. Other Modes of Transport

1. Could you suggest specific streams of traffic, Including their geographic locations, where pipeline transport or ropeways can be constructed on purely economic considerations ?

2. What role can the ropeways play in transportation of men and materials in the hilly areas of the country ? Have any specific studies or projects been undertaken in this field ? If so, with what results ?

1.4 Composition & Terms of Reference of Working Groups

1. Working Group on New Railway Line

Composition

1. Shri G.D. Khandelwal, Former Chairman, Railway Board. — Chairman
2. Shri M. G. Nair, Ministry of Railways. — Member
3. Shri V. R. Ganesan, Director Finance (Budget), Ministry of Railways. — ,,
4. Shri Vijay Singh, Ministry of Railways. — ,,
5. Shri D. Shankaraguruswami, Joint Secretary, Ministry of Finance. — ,,
6. Brig. Gobinder Singh, Addl. Director General, Ministry of Shipping & Transport. — ,,
7. Dr. (Smt.) I. K. Barthakur, Director (Transport) Research), Ministry of Shipping & Transport. — ,,
8. Prof. Moonis Raza, Centre for Regional Development, Jawahar Lal Nehru University. — ,,
9. Shri T. V. Gopalaswamy, Senior Economist, CRRI. — ,,
10. Shri Y. Verma, Deputy Adviser, (Transport), Planning Commission, Convenor

Terms of Reference

a. To assess how far the new railways lines built during the last twenty five years have served the purpose and objectives for which they were constructed.

b. To suggest criteria for the construction of new railway lines particularly in respect of such lines including developmental lines, as can not be justified on purely financial considerations. In suggesting this criteria, should the cost of alternative modes of transport be taken into account and if so, the methodology.

c. To indicate whether the unremunerative railway lines should be continued particularly where the existing railway traffic is such that even the operating costs of the lines are not covered and where services of other modes of transport are available.

d. To suggest the principles for funding the developmental railway lines as are not justified purely on financial considerations and to consider whether the State Government should bear a part of cost of their construction and operation.

Appendix 1.4.2

II. Working Group on Transport Pricing, Taxation and Subsidy

Composition

1.	Dr. R.M. Honavar, Chief Economic Adviser, Ministry of Finance	Chairman
2.	Shri Jagdish Lal, Director, Transport (Commercial), Railway Board.	Member
3.	Shri P.P. Shrivastav, Joint Secretary, Ministry of Home Affairs.	,,
4.	Shri S. R. Shah, Director, Department of Commerce.	,,
5.	Dr. (Smt.) I. K. Barthakur, Director (Transport Research), Ministry of Shipping & Transport.	,,
6.	Shri J. D. Philomen Dos, Director, Ministry of Tourism & Civil Aviation.	,,
7.	Shri Nitin Desai, Consultant, P.A.D. Planning Commission.	,,
8.	Shri Kripal Chand, Director (Finance), Indian Airlines.	,,
9.	Shri R. N. Lal, Director (FR), Planning Commission.	Convenor

Terms of Reference

(i) To suggest appropriate principles for the pricing of different modes of transport, so that some uniformity is achieved.

(ii) To examine and evaluate the present position in the fixation of passenger fares and freight rates on road transport, coastal shipping, inland water transport and air transport and to recommend measures for ensuring that prices in those modes of transport are fixed in accordance with the principles as suggested under item (1) above.

(iii) To examine on the basis of available evidence or such studies as may be initiated by the Group, whether road users as a class pay, through taxation, the cost of construction, maintenance and operation of the road system. Similar studies should be made with regard to terminal facilities, harbours and airports.

(iv) To suggest measures for rationalising the structure of taxation on roads and road transport after taking into account the recommendations made by the Keskar Committee on Road Transport Taxation (1967) and the Jha Committe on Indirect Taxation (1978) and the action, if any, taken thereon particularly with a view to:

- (a) eliminating the multiplicity of taxes on roads and road transport;
- (b) introducing uniformity in the structure of these taxes as between different states;
- (c) bringing about a co-ordinated development of the different modes of transport.

(v) To consider desirability of imposing tolls on users as a means of financing the construction of specific roads and bridges.

(vi) To examine the desirability of subsidising transport with particular reference to the following services:

- (a) Railway suburban passenger services;
- (b) Railway non-suburban short distance services.
- (c) The movement of low rate commodities and commodities of mass consumption by the Railways.
- (d) For the operation of the unremunerative railway lines.
- (e) City operations of bus transport undertakings.

(f) Inter-city operations of bus transport undertakings.

(g) Passenger and freight operations of coastal shipping and inland water transport, including ferry services provided for river crossing.

(vii) To examine the desirability of transport subsidy for essential consumer goods, particularly coal and kerosene oil, for inaccessible and backward areas and specially in the context of deforestation of the sub-Himalayan region.

Appendix 1.4.3

III. Working Group on Employment Intensity of different Modes of Transport

Composition

1. Shri K. S. Raghupati, Secretary, Ministry of Labour. — Chairman
2. Shri A.K. Ramayya, Director, Civil Engineering, Railway Board. — Member
3. Shri S. N. Gupta, Economic Adviser, Railway Board. — ,,
4. Dr. (Smt.) I.K. Barthakur, Director (Transport Research), Ministry of Shipping and Trasport. — ,,
5. Prof. (Miss) Malathi Bolar, Former Director, Institute of Applied Manpower Research, New Delhi. — ,,
6. Shri Ravi Kathpalia, Financial Controller, Ministry of Tourism & Civil Aviation. — ,,
7. Shri M. [illegible]. Verma, Chief (MP), Planning Commission. — Convenor

Terms of Reference

a. To collect and analyse available data and evidence on the employment impact, both direct and indirect of investments (Public and private) in different modes of transport, with particular reference to railways, roads and road transport, coastal shipping, civil aviation and inland water transport;

b. To initiate quick studies on those employment aspects where adequate information is not available and which the Working Group may consider essential for making their recommendations;

c. To study employment potential separately with respect to construction, maintenance and operation of the transport systems in respect of each mode of transport;

d. To indicate separately wherever possible, technical and non-technical components of the employment potential; and

e. To determine the potential for direct employment per unit of investment in the different modes of transport.

Appendix 1.4.4

IV. Working Group on Freight Equalisation

Composition

1. Dr. Y.K. Alagh, Adviser, PPD Planning Commission. — Chairman
2. Shri T.R. Satishchandran, Adviser, Power & Energy, Planning Commission. — Member

3. Shri. M. Satyapal, Adviser, I&M, Planning Commission. — Member

4. Shri I. Mahadevan, Joint Secretary, Department of Industrial Devlopment. — ,,

5. Shri S. R. Shah, Director, Department of Commerce. — ,,

6. Dr. P.N. Kaul, Addl. Economic Adviser, Deptt. of Civil Supplies & Co-operation. — ,,

7. Shri R.N. Saxena/Shri A.P. Ramanan, Joint Director, Railway Broad. — ,,

8. Shri Mahesh Kapoor, Deputy Adviser, Planning Commission. — Convenor

Terms of Reference

a. To indicate the impact of freight equalisation schemes on existing commodities on the location of industries based on available evidence including Marathe Committee Report.

b. To suggest if the freight equalisation policy should cover essential commodities of mass consumption like coal and salt.

Appendix 1.4.5

V. Working Group on Urban Transport

Composition

1. Dr. P. G. Patankar, Chairman, D.T.C., New Delhi. — Chairman

2. Sh. P. S. A. Sundaram* Deputy Secretary (Urban Development), Ministry of Works & Housing. — Member

3. Shri P. N. Chopra, Director, Railway Board. — ,,

4. Shri R.C. Sinha, Exeutive Officer, Association of State Road Transport Undertakings (as representative of Ministry of Shipping & Transport). — ,,

5. Prof. M.S.V. Rao, Head, Traffic and Transport Department, School of Planning & Architecture, New Delhi. — ,,

6. Prof. P.S. Satsangi, I.I.T., New Delhi. — ,,

7. Shri R.C. Sharma, Deputy Adviser, (Transport) Planning Commission. — Convenor

Terms of Reference

a. To identify the main constraints and bottlenecks faced in urban transport and to suggest measures for providing better transport facilities in metropolitan and other cities;

b. To suggest how land-use planning can help in improving the quality of urban transport and reduce the concentration of population in urban agglomerations;

c. To suggest least cost inter - modal mix for urban transport with a view to reducing the capital cost and generating maximum possible employment;

d. To assess the role of taxis, rickshaws and other labour intensive means of urban transport and to suggest improvement thereof;

e. To examine the desirability of setting up of single passenger transport authority for

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* Shri K. Biswas, Director (Urban Development) was member upto 7th September, 1978.

urban transport including its financial and organisational implications; and

f. To suggest measures such as staggering of working hours for regulating and restraining traffic in urban areas.

Appendix 1.4.6

VI. Working Group on Rural Roads

Composition

1. Shri J.S. Marya, Addl. Secretary & DGRD, Ministry of Shipping & Transport. — Chairman
2. Shri B.K. Sharma, Jt. Secretary, Deptt. of Rural Development, Ministry of Agriculture & Irrigation. — Member
3. Shri C.G. Swaminathan, Director Central Road Research Institute. — ,,
4. Dr. D.D Narula, Director, Indian Council of Science Research. — ,,
5. Shri B.S. Sahi, Deputy Adviser, Planning Commission. — ,,
6. Shri D.P. Gupta, Superintending Engineer (Roads), Ministry of Shipping & Transport. — Convenor

Terms of Reference

a. To review the progress made in the construction of rural roads under the various schemes sponsored by the Govt. from time to time and to indentify the factors responsible for shortfall in achieving the targets.

b. To suggest appropriate accessibility, criteria for the construction of rural roads taking into account differences in the size, topography and level of development of villages in different areas of the country.

c. To suggest technical speeifications for the construction of all-weather roads keeping in view the differences in the soil, topography, density of popnlation and the climatic conditions of different areas.

d. To estimate in broad terms the length of rural roads that need to be constructed on the basis of the accessibility criteria as suggested under item (b) above and to indicate the financial outlays required for this purpose taking into account the technical specifications as suggested under item (c) and the regional differences in the construction costs.

e. To indicate an appropriate time phasing for the development of rural roads in accordance with the targets suggested under item (d) and taking into account the outlays provided for this purpose in the Five Year Plan 1978-83 and the likely financial and organisation constraints.

f. To suggest principles for determining the inter-se priority in the selection of rural roads.

g. To recommend appropriate organisational machinery at the district and state levels for the construction and maintenance of rural roads ; also suggest measures for ensuring availability of adequate funds for their maintenance.

h. To assess the socio-economic impact of the construction of rural roads.

Appendix 1.5

search Team and Other Staff that Assisted the Committee

A. UNDP Transport Policy Planning Project

Indian Counterpart Staff

1.	Shri Mahesh Kapoor	......	Deputy Adviser
2.	Shri R.C. Sharma	......	Deputy Adviser
3.	Dr. R.K. Saggar	......	Consultant
4.	Shri R.C. Srinivasan	......	Senior Research Officer
5.	Dr. Tarun Das	......	Senior Research Officer
6.	Shri Ajay Kumar	......	Consultant (till Nov'79)
7.	Shri A.K. Sinha	......	Consultant (till May' 79)
8.	Shri T.S. Khurana	......	Research Officer (till July'79)
9.	Shri O.P. Batra	......	Research Officer
10.	Shri Anup Chopra	......	Senior Economic Investigator

B. Transport Division - Planning Commission

1.	Shri Y. Verma	......	Deputy Adviser
2.	Shri T.V. Gopalaswamy	......	Senior Research Officer (till Oct,79)
3.	Shri K.L. Thukral	......	Senior Research Officer
4.	Shri B.N. Puri	......	Senior Research Officer
5.	Km. Manjula Ramaswamy	......	Research Officer

C. Non-Technical Staff

1.	Shri Virinder Satyal	......	Personal Assistant
2.	Shri O.P. Sachdeva	......	Personal Assistant
3.	Shri Prem Prakash	......	Personal Assistant
4.	Smt. Veena Madan	......	Stenographer
5.	Smt. Devinder Kaur	......	Stenographer
6.	Shri S.R. Sharma	......	Assistant
7.	Shri Ranjit Kumar	......	Upper Division Clerk
8.	Shri Devinder Singh	......	Lower Division Clerk
9.	Shri Tikka Ram	......	Lower Division Clerk